H. P. Roberts Esq^re

with the author's best respects

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DEMONSTRATION

OF

THE NERVES

OF

THE HUMAN BODY.

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BY

JOSEPH SWAN.

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TO

THE ROYAL COLLEGE OF SURGEONS, IN LONDON;

This Work,

FOUNDED ON THE DISSERTATIONS,

TO WHICH

THE FIRST AND SECOND COLLEGIAL PRIZES

WERE ADJUDGED,

IS MOST RESPECTFULLY INSCRIBED,

BY THEIR FAITHFUL,

AND OBEDIENT SERVANT,

JOSEPH SWAN.

PREFACE.

THIS Work will be confined to the illustration of the subjects of the two Collegial Anatomical Prizes adjudged to the Author in 1825 and 1828, by the ROYAL COLLEGE OF SURGEONS IN LONDON. The first was "A Minute Dissection of the Nerves of the Medulla Spinalis, from their origins to their terminations, and to their conjunctions with the Cerebral and Visceral Nerves; authenticated by preparations of the dissected parts." The second, "A Minute Dissection of the Cerebral Nerves, from their origins to their terminations, and to their conjunctions with the Nerves of the Medulla Spinalis and Viscera; authenticated by preparations of the dissected parts."

The Sympathetic and the Nerves of the Thoracic and Abdominal Viscera form an important feature in each subject, and will be placed first. The consideration of this division of the Nervous System is most difficult and perplexing to the student, and is therefore delineated throughout from its origins to its connexions and terminations. The same extensive plan is not required for the explanation of the Cerebral and Spinal Nerves, as all these, except the Par Vagum, can be perfectly

understood by a description taken from either side of the body, as the Nerves of the two sides do not communicate, and do not vary in any material degree either in their origins or course.

Plates of the Nerves cannot at the same time comprehend every object sought by different inquirers; it is therefore necessary to give such views of them as afford the greatest advantages. Had it been endeavoured to preserve the relative situations of the various parts of the subject too exactly, the Nerves must have been delineated in the confined space allotted them by nature, and thus a greater sacrifice made, than either any consideration of utility or appearance could have compensated for.

6, TAVISTOCK SQUARE,
SEPTEMBER, 1830.

PREFACE

TO THE SMALLER EDITION.

After so many years spent in the completion of his large work, it is not to be supposed that the Author would willingly or unnecessarily again pursue the same laborious track. But soon after the first two numbers were published, it was threatened from several quarters that a smaller edition would be pirated; and as profit would have been the principal motive for such an undertaking, the correctness of its execution would probably have been an inferior consideration.

It became, therefore, essential for the Author's reputation, as well as for the usefulness of the work, that a design of this sort should, as far as possible, be counteracted. After consulting several of his Professional friends, it appeared to be the general opinion, that a smaller edition would certainly be useful to students; and the opportunity the Author had of availing himself of the assistance of the eminent Artists who executed the large work, determined him to prepare such smaller edition for publication without any delay. The greatest possible care

has been bestowed on every portion of it ; and the Artists have acted liberally and faithfully ; but still, without considering the Author's time, and the probable infringement on the interests of the large work, the unavoidable expenses would have placed it out of the reach of many, provided the price had been calculated according to the usual limited demand for anatomical works. The Author has consequently resolved to publish it on such terms as will effectually prove that, however he may be mistaken in anticipating an extensive sale, at least no selfish considerations have interfered to prevent its general usefulness.

TAVISTOCK SQUARE,
JUNE, 1834.

THE SYMPATHETIC NERVE.

THE sympathetic nerve extends from the sixth nerve of the brain to the extremity of the sacrum. Its general form is nearly the same on each side of the body, inasmuch as there is a chord which is evidently its prolongation or continuation; but in the two sides of many subjects, its different parts neither correspond in thickness, nor in the number nor size of its ganglia and branches.

The prolongation and all the nerves attached to the ganglia are pearly or white in appearance, unless inflamed, or coloured by an exudation of blood, or some excrementitious matter, and resemble the spinal nerves whilst contained within the sheath formed by the dura mater, in having the same deficiency of neurilema.

The ganglia of a healthy subject appear firm, nearly white, or pearly, and without blood-vessels. When divided there is a somewhat pulpy appearance; but when pressed every part feels firm, and a very small quantity of blood oozes out. The blood-vessels are derived from those contiguous to the ganglia, and are similar to those of the conjunctiva and sclerotica of the eye, and in the same manner become apparent after a minute injection, or inflammation, or any peculiar excitement.

After a minute examination, a ganglion appears in the following manner. For instance. The termination of the splanchnic nerve divides into an infinity of ramifications, which become entirely blended in the substance of the semilunar ganglion; the nerves afterwards arising from the ganglion are seen first in its substance as very minute white streaks, and these collecting into threads, join together to form branches to be distributed to the viscera. The structure of the other ganglia of the sympathetic appears nearly the same as that of the semilunar; the branches proceeding from these begin in a similar manner, and, on approaching the spinal nerves, separate into minute threads, and become incorporated with their fibrils.

The following mode of examining the sympathetic has hitherto appeared the most satisfactory. The ganglia, with their branches attached to portions of the spinal nerves, should be removed from the subject and immersed in water for two or three days; these should then be kept in equal parts of the solution of potassa and water for twenty-four hours, and afterwards well washed with water, and then extended on paper for examination with a magnifying glass, when sometimes a little spirits of wine dropped on them makes the minute nerves more distinct.

The ganglia of the sympathetic appear to consist of a peculiar substance in man and some animals, and in several respects different from the nerves attached to them; but in many animals the ganglia are more coarsely constructed, being fibrous, and composed of bundles of nerves interwoven with each other.

Some of the ganglia preserve a similarity of form in their respective regions, but nevertheless vary much as to their size and number. The superior cervical ganglion in man is always oblong, and its length varies very much in different subjects; the inferior cervical is flat, but thickened, and of no determinate shape; the first thoracic is oblong, broad above and narrow at its inferior part; the rest of those placed in the thorax are frequently very much extended, flat, and like membrane. In the abdomen the semilunar ganglion is flat, but usually thick, and of no determinate shape; its continuation is frequently membranous. The lumbar and sacral ganglia are a little thicker than the thoracic, but not so much extended. Instead of a ganglion there will not unfrequently be a membranous expansion connecting different nerves; and this is present not only in the usual situations of the ganglia, but in the different plexuses and in some parts of the mesentery and mesocolon, and particularly at the connection of each hypogastric plexus with the third and fourth sacral nerves. These portions of membrane the student should be careful not to remove, as he will otherwise cut off the communication of several nerves, and his dissection will then be confused and unsatisfactory. The same membranous appearance is not unfrequently seen in other nerves, but never to the same extent. In strong and robust subjects every part of the sympathetic is much larger than in others of delicate form, and therefore for dissection one of the former, from which the greatest part of the fat has been absorbed by an illness sufficiently protracted, should be chosen.

THE CERVICAL AND THORACIC PORTIONS OF THE SYMPATHETIC NERVE.

THE RIGHT SIDE.

The sixth nerve of the brain is connnected with a very intricate plexus in crossing the internal carotid artery. Several filaments are given to the Gasserian ganglion, and others ascend on the internal carotid to communicate with some of the nerves of the orbit, and these will be particularly noticed in the demonstration of the cerebral nerves. About the middle of the carotic canal the plexus is joined by the inferior branch of the Vidian nerve, and in many subjects then assumes a fleshy or ganglionic appearance. It receives the filament from the tympanine branch of the glosso-pharyngeal, and this also will be pointed out in the demonstration of the cerebral nerves. Filaments are sent from the plexus to the membrane lining the carotic canal, and portions of it frequently adhere so closely to this membrame as not to be easily separated. Part of the plexus passes in front and the rest behind the internal carotid to terminate in the first cervical ganglion.

The sympathetic nerve is said to arise from the sixth and a branch of the Vidian, but this cannot be reconciled with the usual description of the origin of a nerve. If the sixth only be examined, we may suppose that the filaments proceeding from it form the origin of the sympathetic; but if the carotic canal be laid open, and the sympathetic carefully traced from the first cervical ganglion; if the second, and also the third trunk of the fifth be divided, so that the exterior edge of the Gasserian ganglion can be sufficiently raised, it may be observed that the branches on the carotid artery not only ascend to join the Vidian and the sixth, but some filaments are also communicating in a similar manner with the Gasserian ganglion. In many animals, it is evident that the branches ascending from the first cervical ganglion are principally for connecting it with the Gasserian ganglion; and although in some a communication with the sixth takes place, yet it does not in others, and this is generally so insignificant in comparison

with the branches given to the Gasserian from the first cervical ganglion, that no doubt can be maintained that the branches proceed from the sympathetic to the sixth; and although in man it may appear more as if the branches were passing from the sixth to the sympathetic, yet when all these circumstances are taken into consideration, it must be concluded that the branches ascend from the first cervical ganglion to communicate with the sixth, the spheno-palatine and the different parts of the Gasserian ganglion.

On immersing the first cervical ganglion of the sympathetic of a sheep, and the Gasserian ganglion with a portion of its nerves, in the solution of potassa, the cervical ganglion and its branches became quite transparent, and proceeded with the same appearance to their connection with the Gasserian ganglion; this was white, and therefore had the branches proceeded from it to the first cervical ganglion of the sympathetic, these would have been white also. It may therefore be fairly concluded, that these were passing from the sympathetic to the Gasserian ganglion.

For the sake of greater perspicuity, the principal continuation from one ganglion to another is called the prolongation; and when a branch is stated as proceeding from this, it is from the part below the preceding ganglion. When branches are stated as passing from the outer or inner side, it means in the former that farthest from, and in the latter that nearest the middle line.

I. The first cervical ganglion usually begins about the upper part of the second vertebra; it varies in length, and in some subjects extends nearly as far as the fifth, and is placed behind the internal carotid artery. The connexion with the glosso-pharyngeal and the eighth and ninth will be considered in the description of the cerebral nerves. On its outer side it gives off several branches forming a plexus, 34 P. I., and communicating with the right trunk of the par vagum and the suboccipital and the first and second cervical nerves; another branch is sent off to join the first and a branch of the second cervical nerve passing to the gangliform membrane, 12 P. I. From the inner side a large branch, 32 P. I., and some smaller ones are given to the pharyngeal plexus; and this will be considered in the description of the cerebral nerves. At its inferior part it gives off a branch communicating with the external laryngeal nerve, 33 P. I., and sending a branch to the branch 45 P. I., which forms part of the right lateral cardiac plexus. The prolongation passes down behind the carotid artery, and on its outer side sends the branch 35 P. I. to communicate with the branch of the second cervical nerve joining the descending branch of the ninth, and with the plexus 34 P. I. from the first cervical ganglion, and then with the prolongation; it gives another

branch on its outer side, 36 P. I., to communicate with the third cervical nerve and with the branch 40 P. I. from the second cervical ganglion, and sends a branch downwards to join the plexus 39 P. I. on the branches of the subclavian artery. On its inner side the prolongation communicates with the par vagum; it sends off the nerve 45 P. I. to the right lateral cardiac plexus. Lower down it gives off the branch 47 P. I., dividing into many small ones, and communicating with the nerves 45 and 48 P. I. and the plexus on the inferior thyroideal artery; it then gives off the nerve 48 P. I. to the right lateral cardiac plexus, and having sent several small branches to the plexus 39 P. I. on the branches of the subclavian artery, terminates in the second cervical ganglion.

II. The second cervical ganglion is situated at the inferior part of the sixth vertebra. From its outer side the branch 40 P. I., 45 P. III., is given off, and pierces the fibres of the anterior scalenus muscle, to join the fourth cervical nerve; another branch, 38 P. I. 44 P. III., passes into the canal with the vertebral artery, and unites with the branch 46 P. III. from the third cervical ganglion, and forms a plexus on the vertebral artery to communicate with the five superior cervical nerves and the suboccipital; several filaments uniting into a branch are given to communicate with the branch 40 P. I., 45 P. III., and terminate in the fifth cervical nerve. From its inner side a branch passes to the nerve 48 P. I., and several others to the plexus 39 P. I. on the branches of the subclavian artery. The prolongation is a continuation of the ganglionic structure to the third cervical ganglion.

III. The superior part of the third cervical ganglion receives some of the branches of the plexus 39 P. I. passing round the subclavian artery, and sends a branch to communicate with this plexus and the phrenic nerve; the branches encircling this artery are frequently given from the third cervical ganglion to the first thoracic. On its outer side it sends off the branch 47 P. III., giving a branch to the sixth cervical nerve, and terminating in 46 P. III., to communicate with the branch 44 P. III. on the vertebral artery; two branches, 48 P. III., are given off, one to the sixth, the other to the seventh cervical nerve. The prolongation passes underneath the subclavian artery, and on the first rib, terminates in the first thoracic ganglion.

I. The first thoracic ganglion can hardly be separated from the third cervical, there being no discontinuation of the ganglionic structure. It gives branches on its outer side to the junction of the seventh cervical with the first dorsal nerves, 49, 50 P. III., and sends a branch to the second dorsal nerve. On its inner side it gives two filaments to join one from the prolongation and pass to the right thoracic plexus; it is then con-

tinued into the prolongation, and this at the head of the second rib terminates in the second thoracic ganglion.

II. The second thoracic ganglion on its outer side gives three branches to the second dorsal nerve. On its inner side it gives two filaments to the right thoracic plexus. The prolongation is continued a very short distance, and at the head of the third rib terminates in the third thoracic ganglion.

III. The third thoracic ganglion on its outer side gives a branch joined by one from the prolongation near the fourth ganglion to the third dorsal nerve. On its inner side it gives, at its superior part, a branch to the right thoracic plexus, and two others, with one from the prolongation, to communicate with the right thoracic plexus. The prolongation is again continued down, and about the head of the fourth rib terminates in the fourth thoracic ganglion.

IV. The fourth thoracic ganglion on its outer side sends four branches to the fourth dorsal nerve, and a branch to the fifth dorsal nerve. On its inner side it sends three branches to the right thoracic plexus, and one to the aorta. The prolongation is then continued down, and terminates in the fifth thoracic ganglion.

V. The fifth thoracic ganglion on its outer side sends two branches to the fifth dorsal nerve. On its inner side it gives a branch sending several filaments to the aorta, and then joining the great splanchnic nerve; it gives another to the aorta. The prolongation is then continued down, and at the head of the sixth rib terminates in the sixth thoracic ganglion.

VI. The sixth thoracic ganglion on its outer side gives two branches to the sixth dorsal nerve. On its inner side it sends two branches to the aorta. The prolongation is then continued down, and at the head of the seventh rib terminates in the seventh thoracic ganglion.

VII. The seventh thoracic ganglion on its outer side gives two branches to the seventh dorsal nerve. On its inner side it sends several branches to the aorta and the ligaments of the spine, and a large branch to give some filaments to the aorta, and then pass to the great splanchnic nerve. The prolongation is then continued down, and at the head of the eighth rib terminates in the eighth thoracic ganglion.

VIII. The eighth thoracic ganglion on its outer side gives a branch to the eighth dorsal nerve. On its inner side it gives a considerable branch to the great splanchnic nerve, and one joined by another from the ninth to the aorta. The prolongation is then continued down, and at the head of the ninth rib terminates in the ninth thoracic ganglion.

IX. The ninth thoracic ganglion on its outer side gives a large branch to the ninth dorsal nerve, and a small one to the cellular membrane on the rib. From its inner side and the prolongation several branches are sent to the aorta. The prolongation passes down, and at the head of the tenth rib terminates in the tenth thoracic ganglion.

X. The tenth thoracic ganglion on its outer side gives two branches to the tenth dorsal nerve. On its inner side it sends off a branch joined by another from the prolongation to unite and form the lesser splanchnic nerve, 86 P. III; this communicates with the great splanchnic nerve, and then passes through the diaphragm to terminate in the right emulgent plexus. The prolongation is continued down, sending on its outer side a branch to the eleventh dorsal nerve, and on its inner side one to accompany the last dorsal artery, and at the head of the eleventh rib terminates in the eleventh thoracic ganglion.

XI. The eleventh thoracic ganglion on its outer side gives a thick branch to the eleventh dorsal nerve, and one to the twelfth. On its inner side it gives a branch to accompany the last dorsal artery; it sends off two branches, 87 P. III., to unite and terminate in the right emulgent plexus. The prolongation then passes through the diaphragm, and sends back two branches to the twelfth dorsal nerve, and at the beginning of the side of the second lumbar vertebra terminates in the first lumbar ganglion.

THE LEFT SIDE.

THE plexus of the sympathetic on the internal carotid varies very little from that of the right side, except that in this subject it terminates in two portions, which pass behind the internal carotid to the first cervical ganglion.

I. The first cervical ganglion on its outer side gives a branch to communicate with the ninth, the suboccipital and first cervical nerves; a little lower down another branch communicates with the preceding one, gives a filament to the membrane on the transverse process of the second vertebra, and terminates in the first cervical nerve; a little lower down two branches, 31 P. II., are sent to the first cervical nerve, and a little lower down one is generally given to the second, but in this instance the communication is produced by the union of the branch of the second cervical nerve with the first; a branch is given to the membrane over the larger anterior straight muscle of the

head. From its inner side and superior part two thick branches, 29 P. II., are given to the pharyngeal plexus, and lower down two more unite to pass to the part of the pharyngeal plexus usually termed the external laryngeal nerve, 30 P. II.; and still lower, one, after communicating with the preceding branch, passes forward to join the nerve given to the left lateral cardiac plexus, 42 P. II. After forming the first cervical ganglion the prolongation passes down. On its outer side it sends off 32 P. II. to join the third cervical nerve; another branch, 34 P. II., divides and sends a filament upwards with a branch of the inferior thyroideal artery to pass deeply between the fibres of the long muscle of the neck; the other part of the branch 34 communicates with a branch of the plexus on the inferior thyroideal artery, and the branch 37 arising from the second cervical ganglion and joining the fourth and fifth cervical nerves; a large branch, 33 P. II., is next given off to pass between the fibres of the long muscle of the neck and communicate with the fourth and fifth cervical nerves, and the branches of the branch 38 sent from the third cervical ganglion along the vertebral artery. The prolongation on its inner side sends a branch to join the one from the first cervical ganglion going to the nerve 42 P. II. Lower down another branch is sent off communicating with the preceding one and the same branch from the first cervical ganglion, and then passes behind the carotid artery to communicate with the recurrent nerve, and send a branch on the inferior thyroideal artery to communicate with the plexus on that artery. Several filaments are then given off to unite into one branch and join the continuation of the nerve 42 P. II. Lower down a considerable branch is given to the small ganglion at the inferior part of the continuation of the nerve 42 P. II. and to communicate with the plexus on the inferior thyroideal artery. The prolongation then terminates in the second cervical ganglion.

II. The second cervical ganglion on its outer side sends a large branch, 37 P. II., dividing into four branches, and piercing the fibres of the anterior scalenus muscle to terminate in the fourth and fifth cervical nerves; another branch, 35 P. II., passes to the phrenic nerve and communicates with the plexus on the branches of the subclavian artery; at its inferior part it gives off a large branch, 61 P. II., sending a branch to the gangliform enlargement 48 P. II. on the subclavian artery, and then winding round this artery to join the third cervical ganglion; a branch is next given to the gangliform enlargement 47 P. II., and this communicates with the preceding branch given to the gangliform enlargement 48 P. II., and sends a branch behind the vertebral artery to the third cervical ganglion. Two branches then pass before, and others behind the vertebral artery, as the prolongation to the third cervical ganglion.

III. The third cervical ganglion on its outer side sends a large branch, 38 P. II., 43 P. IV. to accompany the vertebral artery, and form an extensive communication with the branch from the prolongation 33 P. II. 41 P. IV. and the six superior cervical and the suboccipital nerves. Three branches 45 P. IV. are next given off to the sixth and seventh cervical nerves; and another 46 P. IV. to divide and terminate in the seventh cervical and first dorsal nerves. On its inner side a branch is given to the subclavian artery; and another to divide and join 96 P. IV. and the gangliform enlargement 64 P. IV. It receives a branch 95 P. IV. 61 P. II. which communicates with the preceding branch going to 96 P. IV.; another branch is sent to the gangliform enlargement 64 P. IV. It then terminates in the first thoracic ganglion.

I. The first thoracic ganglion is large, and placed just between the heads of the first and second ribs. On its outer side two branches are given to the first dorsal nerve. On its inner side a filament is given to communicate with a filament from the gangliform enlargement 64 P. IV., and join the left thoracic plexus 77 P. IV.; another branch is given to this plexus from the prolongation before it terminates in the second thoracic ganglion.

II. The second thoracic ganglion is placed between the heads of the second and third ribs; on its outer side two branches are given to the second dorsal nerve, and one passes behind the prolongation to the left thoracic plexus 79 P. IV. On its inner side two filaments are given to the left thoracic plexus 77 P. IV. The prolongation is then continued down, and at the head of the third rib terminates in the third thoracic ganglion.

III. The third thoracic ganglion communicates on its outer side with the third dorsal nerve. On its inner side it gives a branch 78 P. IV. to the left thoracic plexus. It again forms the prolongation, and on the head of the fourth rib terminates in the fourth thoracic ganglion.

IV. The fourth thoracic ganglion on its outer side communicates by two branches with the fourth dorsal nerve. On its inner side it gives off several filaments, which soon unite and terminate in the left thoracic plexus 79 P. IV.; it sends a branch down to the plexus on the aorta; another branch, and two from the prolongation, are also given to the plexus on the aorta. At the head of the fifth rib the prolongation terminates in the fifth thoracic ganglion.

V. The fifth thoracic ganglion on its outer side gives two branches to the fifth

dorsal nerve. On its inner side it sends two branches to the plexus on the aorta; it gives a branch to the great splanchnic nerve. There is no discontinuation of ganglionic structure, but for the sake of convenience the part at the head of the sixth rib will be called the sixth thoracic ganglion.

VI. The sixth thoracic ganglion on its outer side gives two branches to the sixth dorsal nerve. On its inner side one branch is given to the plexus on the aorta, and another to join the great splanchnic nerve. The ganglion then diminishes again into the prolongation, and at the head of the seventh rib terminates in the seventh thoracic ganglion.

VII. The seventh thoracic ganglion on its outer side gives two branches to the seventh dorsal nerve, and a branch to the ligaments of the spine; it sends another down to give a branch to the ligaments of the spine, and communicate with the eighth thoracic ganglion and one of the branches sent from this to the eighth dorsal nerve. On its inner side it gives a large and small branch to the great splanchnic nerve. The prolongation sends a branch to the aorta, and then passes to the head of the eighth rib, where it terminates in the eighth thoracic ganglion.

VIII. The eighth thoracic ganglion on its outer side gives two branches to the eighth dorsal nerve. On its inner side it gives a branch to the aorta, and a large branch to communicate with the plexus on the aorta, and then terminate in the great splanchnic nerve. The prolongation gives a branch to the aorta, and on the head of the ninth rib terminates in the ninth thoracic ganglion.

IX. The ninth thoracic ganglion on its outer side gives two branches to the ninth dorsal nerve. On its inner side it gives a filament to the branch from the eighth thoracic ganglion joining the great splanchnic nerve. The prolongation enlarges, and gives off a large branch to the great splanchnic nerve, and two to the aorta; it diminishes again, and at the head of the tenth rib terminates in the tenth thoracic ganglion.

X. The tenth thoracic ganglion gives a large branch on its outer side to the tenth dorsal nerve. The prolongation appears to be continued into the lesser splanchnic nerve 92 P. IV.; this gives two branches to the aorta, and sends outwardly a large branch, forming at the head of the eleventh rib the eleventh thoracic ganglion.

XI. The eleventh thoracic ganglion communicates on its outer side with the eleventh and twelfth dorsal nerves. On its inner side it gives a branch to the aorta. The prolongation then passes through the diaphragm, and near the beginning of the second lumbar vertebra terminates in the first lumbar ganglion.

THE

NERVES OF THE HEART AND LUNGS.

THE nerves of the heart and lungs may be divided into the following plexuses:— The right and left lateral cardiac, the ventricular, the auricular, the right and left anterior pulmonary, the right and left posterior pulmonary, the right and left thoracic.

The branches forming the origin of the cardiac nerves vary in almost every subject, and are generally derived from the part of the pharyngeal plexus termed the external laryngeal nerve, the par vagum, and the sympathetic and its ganglia. The communications of these form a very complicated plexus, for the most part situated behind the common carotid artery, and may be properly denominated the right or left lateral cardiac plexus. The greatest part of the branches proceeding from each plexus passes behind the arteria innominata on the right side, and the arch of the aorta on the left; others pass both in front of these and the subclavian arteries, and then principally terminate in the ventricular and auricular plexuses.

The right lateral cardiac plexus begins with the nerve 45 P. I.; this receives a branch from the prolongation from the first cervical ganglion of the sympathetic, and passes downwards and divides into two principal branches; the one on the outer side receives a branch from another branch of the prolongation 47 P. I. and terminates in a branch of the nerve 48 P. I. on the subclavian artery; the one on the inner side is joined by a branch of the first cervical ganglion communicating with the external laryngeal nerve 33 P. I., and divides and terminates in the branches of the nerve 48 P. I., passing both before and behind the subclavian artery.

A branch, 46 P. I., is then sent from the right trunk of the par vagum, and is joined by another from the same nerve; it gives a branch to the sterno-hyoideal-muscle, and then passes over the subclavian artery to terminate in the nerve 48 P. I.

A thick branch 47 P. I. is then sent from the prolongation near the second cervical

ganglion: it divides into many very small branches; one joins the outer branch of the nerve 45 P. I. and the rest the nerve 48 P. I. and the plexus on the inferior thyroideal artery.

The next branch 48 P. I. arises from the part of the prolongation terminating in the second cervical ganglion; it communicates with the plexus surrounding the inferior thyroideal artery; it then passes down a little way, and divides into two branches; the smaller one passes over the subclavian artery and communicates with the plexus surrounding this artery from the right trunk of the par vagum and the third cervical ganglion, receives the branches of the nerve 45 P. I., and communicates on the subclavian artery with the right trunk of the par vagum, and joins the branch of the right trunk of the par vagum 46 P. I. near the junction of the principal branches of this nerve 48 P. I. The larger branch divides into two others to pass behind the subclavian artery: the inner one communicates with the recurrent nerve, and in passing behind the subclavian crosses the outer one so as to be placed on the outer side, and terminates at the junction of the principal branches of this nerve, a short distance from the ventricular plexus: the outer one, on the contrary, gets to the inner side, and after communicating with other branches proceeding from this nerve 48 P. I. and the ventricular plexus, gives off the branches 51, 51, 51 P. I., 52, 52, 52 P. II. to the arteria innominata and aorta, and to communicate with branches from the anterior part of the ventricular plexus. The junction of the principal branches of this nerve gives filaments to the aorta, communicates with the auricular plexus, and terminates in the ventricular plexus.

The plexus 39, 39 P. I. on the subclavian artery and its branches is so connected with the lateral cardiac plexus, that it may be considered as part of it.

On the left side the nerve 42 P. II. communicates with the external laryngeal 30 P. II., the first cervical ganglion of the sympathetic, and the prolongation below this; it has two principal terminations, one in the branch of the left trunk of the par vagum 43 P. II. passing to the ventricular plexus; the other, after receiving a branch arising by several filaments from the prolongation, in a small ganglion with a branch having communications with the prolongation and the plexus surrounding the inferior thyroideal artery; this small ganglion gives off inferiorly two branches: that on the inner side divides, and sends one branch to terminate in the recurrent, and the other in the branch 46 P. II. terminating in the ventricular plexus; that on the outer side communicates with its fellow and the recurrent, and then terminates in another small ganglion, 44 P. II.

A branch of the left trunk of the par vagum 43 P. II. receiving the portion of the nerve 42 P. II. communicates with the inner branch from the small ganglion 44 P. II. and passing over the arch of the aorta, terminates in the cardiac ganglion, which anteriorly forms the centre of the ventricular plexus 40 P. II.

The small ganglion 44 P. II., in which the outer branch of the nerve 42 P. II. terminated, receives a thick branch arising from the prolongation just above the second cervical ganglion; it sends a branch downwards on the arch of the aorta to join a branch from the gangliform enlargement 48 P. II. situated on the subclavian artery; it is then continued downwards to join another branch from the gangliform enlargement 48 P. II.; it communicates with the ventricular plexus, and then passes on the pulmonary artery, to which it gives several branches; it communicates also with branches of the auricular plexus coming from underneath the pulmonary artery, and sends a branch downwards 50 P. I. to give filaments to the pulmonary artery and communicate with branches of the large branch 49 P. I. accompanying the anterior coronary artery. The other portion of the small ganglion 44 P. II. terminates a little lower down in another small ganglion 45 P. II.

The small ganglion 45 P. II. sends a small branch externally to terminate on the subclavian artery in one of the branches of the gangliform enlargement 48 P. II., and a large one on its outer side to unite with a branch of the small ganglion receiving the outer branch of the nerve 42 P. II., and form the branch 46 P. II.; the branch proceeding from the inner side of this ganglion 45 P. II. is then continued down to divide into two to pass behind the arch of the aorta, one to terminate in the coats of the aorta the other in the ventricular plexus 53 P. I. and 62 P. IV.

The branch 46 P. II., 63 P. IV., divides into two other branches to pass behind the arch of the aorta and terminate in 70 P. IV., the communication between the ventricular, the auricular, and the right and left thoracic plexuses, and the left trunk of the par vagum and recurrent.

The gangliform enlargement 47 P. II., 64 P. IV., formed by branches from the second cervical ganglion, sends several filaments behind the subclavian artery; two of these join the third cervical ganglion; one 63 P. II., 97 P. IV. winds round the thoracic side of the subclavian artery, to join the gangliform enlargement 48 P. II.; one passes to the thoracic plexus 77 P. IV. A branch passes over the cervical side of the subclavian and divides and joins the gangliform enlargement 48 P. II. The principal branch 65 P. IV. and seen as the continuation towards the back of the aorta at

the cervical side of the subclavian artery from 47 P. II., forms very extensive communications; it gives several filaments to the subclavian artery; a branch 66 P. IV. receives another from the gangliform enlargement 64 P. IV., and part of it is seen on the thoracic side of the subclavian artery 57 P. II., passing over the arch of the aorta and communicating with the recurrent, and then passing behind the left branch of the pulmonary artery to the posterior pulmonary plexus; the other part of 66 P. IV., 58 P. II., terminates at the union 70 P. IV. between the left trunk of the par vagum, the recurrent, the terminations of the left lateral cardiac in the ventricular plexus, and the branches of the right and left thoracic plexuses; the continuation of 65 P. IV. sends a branch 98 P. IV., 64 P. II. to join the gangliform enlargement 48 P. II.; it then communicates with the branches sent to the left side from the right thoracic plexus, and terminates at the junctions of the left lateral cardiac in the ventricular plexus 67 P. IV.

The gangliform enlargement 48 P. I., receiving a branch from that part of the sympathetic 61 P. II. passing over the subclavian artery, and small filaments from the branch of the second cervical ganglion leading to the gangliform enlargement 47 P. II. sends off two branches to communicate with the branches 44 P. II. on the arch of the aorta, and others to pass over the cervical side of the subclavian artery and communicate with the small ganglion 45 P. II. and the gangliform enlargement 47 P. II.; others pass over the thoracic side of the subclavian artery; one joins 61 P. II., 95 P. IV.; three 62 P. II., 96 P. IV. unite and join the preceding branch and the third cervical ganglion; another 63 P. II., 97 P. IV. joins the gangliform enlargement 47 P. II., 64 P. IV.; another 64 P. II., 98 P. IV. joins a branch of 65 P. IV. proceeding from the same gangliform enlargement 47 P. II., 64 P. IV.

If a name were to be given to each branch of the lateral cardiac plexus, on the right side the nerve 45 P. I. would be the superficial cardiac; the one 48 P. I. the great cardiac; and 47 P. I. a lesser deep cardiac: on the left side 42 P. II. would be the superficial cardiac, and 44 P. II. might be considered as its continuation; and 45, 46, 47, 48 P. II. the deep cardiac nerves. All these are so intermixed that it is difficult to determine the precise point either of their beginning or termination as distinct nerves.

If the sympathetic and its ganglia corresponded in different subjects and gave off similar branches to form the cardiac nerves, it would in every respect be advantageous to have a specific name for each nerve; but as there is so much uncertainty, particularly as to the extent both of the prolongation of the sympathetic and its ganglia, and consequently as to the situation, size, and number of the branches given off from these,

it will be much less perplexing to the student and quite as conducive to every useful purpose, to call all the nerves arising from the sympathetic nerves and the par vagum in the neck and proceeding to the heart and its large vessels, the right and left lateral cardiac plexuses.

The ventricular plexus 41 P. I., 40 P. II., 61 P. IV. is situated just under the middle of the arch of the aorta, and the cardiac ganglion may be termed its centre.

In a hasty dissection an absorbent gland may be mistaken for the cardiac ganglion ; this varies in appearance, like the other ganglia of the sympathetic, and is sometimes fleshy, and frequently resembling a portion of thick membrane, but is neither so tender nor easily torn asunder as the absorbent gland. The ventricular plexus receives the principal part of each lateral cardiac plexus. It communicates with the auricular and left posterior pulmonary plexuses, and divides into branches encircling the ascending aorta and its arch and the trunk of the pulmonary artery, and following the anterior and posterior coronary arteries to be distributed on the ventricles.

The branches of each lateral cardiac plexus have been mentioned as terminating principally in the ventricular; it remains therefore to describe particularly the other connections of the ventricular plexus and also its terminations.

Besides several small branches distributed on the aorta and pulmonary artery, the ventricular plexus gives a branch 61 P. I., 53 P. II., to pass to the anterior part of the aorta, and wind round 49 P. I. to distribute branches and communicate with others on the aorta and pulmonary artery, and accompany the anterior coronary artery to give two filaments to the right auricle and terminate in the ventricles. Two other branches are given off 58 P. I., 54, 54 P. II.; these pass on the aorta, and communicate with the plexus of small branches distributed on this vessel, and then pass underneath the pulmonary artery 50 P. II., communicate with a branch of 49 P. II., and follow some branches of the posterior coronary artery to terminate on the left ventricle. Two other branches are given off 57 P. I. 59 P. II. to pass behind the pulmonary artery, the smaller one to terminate on this artery, the larger one in the plexus 50 P. II.; another branch 56. 56 P. I. having given a branch to the auricular plexus, passes first behind the right division of the pulmonary artery, then forward, and sends a branch on this part of the artery to join a branch of the anterior pulmonary plexus 43 P. I.; it afterwards divides and passes at the posterior part of the pulmonary artery, to which it gives a branch, and having reached its inferior part 49 P. II., communicates with the plexus

of nerves distributed on this artery, and accompanies the posterior coronary artery to terminate on the ventricles.

The ventricular plexus communicates at the back of the descending part of the arch of the aorta with the recurrent 56 P. II., 69 P. IV., with the left posterior pulmonary plexus, and the branches of the right and left thoracic plexuses 70 P. IV.

The auricular plexus is situated on the front of the trachea at its bifurcation; it communicates with the ventricular plexus, with the right and left lateral cardiac plexuses, the left recurrent, and the right anterior pulmonary plexus; it sends branches behind the right division of the pulmonary artery, and these 60, 60 P. I., after forming another connexion at the inferior margin of this vessel with branches of the right anterior pulmonary plexus 43 P. I., are distributed on the right auricle and the pulmonary veins. The branch 51 P. II. and several others pass underneath the left branch of the pulmonary artery, and are joined by branches of the left anterior pulmonary plexus 41, 41 P. II., and branches of the left lateral cardiac plexus 44 P. II., and terminate on the left auricle and its pulmonary veins.

The anterior pulmonary plexuses 43 P. I., 41. 41 P. II. are situated at the anterior part of the root of each lung, and are formed of two or three branches either from each trunk of the par vagum or the recurrent; these communicate with the branches of the auricular plexus, and terminate on the anterior part of each lung and the pulmonary artery and veins.

The posterior pulmonary plexuses 69 P. III., 71 P. IV. are situated at the posterior part of the root of each lung, and consist of many very considerable branches sent from each trunk of the par vagum; some small branches are given to the parenchymatous structure of the lung, but the principal part of these passes along the divisions of the trachea to terminate in the air cells.

The right and left thoracic plexuses are formed of branches of several of the superior thoracic ganglia of the sympathetic; these communicate with each other, and with the anterior and posterior pulmonary and the ventricular plexuses. For the purpose of tracing the connexions of these several plexuses, it is necessary to divide the aorta at its arch, after the dissection of the nerves of the heart has been nearly completed. This division may be made with advantage, when it only remains to trace such branches of each thoracic plexus as have their terminations in the ventricular and posterior pulmonary plexuses; but if it be done before the dissection of the nerves of the heart has

been in all other respects completed, the displacement of the parts will create the greatest confusion.

The right thoracic plexus consists of branches from the prolongation of the third cervical ganglion, and from the first, second, third, and fourth thoracic ganglia; these form a plexus 81 P. III. communicating with the right anterior and posterior pulmonary plexuses 68. 69 P. III., and send some branches to accompany the bronchial artery and terminate in the lung; the plexus then forms the branches 76. 77. 78. 79. 80 P. III. 72. 73. 74. 75. 76 P. IV. to pass behind the œsophagus and communicate with the ventricular, the left posterior pulmonary and left thoracic plexuses.

The left thoracic plexus consists of branches from the first thoracic ganglion and its prolongation, and the second, third, and fourth thoracic ganglia; these form a plexus 77. 78. 79 P. IV. to communicate with the right thoracic, the left lateral cardiac 64 P. IV., the ventricular and left posterior pulmonary plexuses.

The branches from the sympathetic, the thoracic ganglia and their prolongations, and the splanchnic nerves, described as given to the aorta, may be considered as a continuation of the thoracic plexus of each side; but it nevertheless seems to have been principally intended that these branches should supply the coats of the aorta and its branches, the absorbents, the cellular tissue, and the ligaments of the spine, for the peculiar uses of these parts.

THE LUMBAR AND SACRAL PORTIONS OF THE SYMPATHETIC NERVE.

THE RIGHT SIDE.

THE prolongation having passed through the diaphragm, sends back from its outer side two branches to the twelfth dorsal nerve. On its inner side it sends a branch to accompany the first lumbar artery, and give filaments to the ligaments of the spine; and then, about the beginning of the second lumbar vertebra, terminates in the first lumbar ganglion. The lumbar portion of the sympathetic nerve is placed towards the anterior part of the side of the lumbar vertebræ, and the branches passing from this to the lumbar nerves are very much concealed by the origins of the great psoas muscle

I. The first lumbar ganglion, on its outer side, gives a branch to the first and second lumbar nerves. On its inner side it communicates with the emulgent plexus, and the gangliform expansion joining the aortic plexus. The prolongation is then continued down, and on the lowest part of the second lumbar vertebra terminates in the second lumbar ganglion.

II. The second lumbar ganglion, on its outer side, sends a branch to divide into two, one of these divides again before uniting with the junction between the first and second lumbar nerves, and the other joins the second and gives filaments to the ligaments; it sends another branch to the second, and one to the third lumbar nerve. On its inner side it gives a branch to the ligaments, and a considerable one to the aortic plexus. The prolongation is then continued down, and on the intervertebral substance between the third and fourth lumbar vertebræ forms the third lumbar ganglion.

III. The third lumbar ganglion sends a branch to the fourth lumbar nerve, and on its inner side filaments to pass behind the iliac artery to the aortic plexus and the ligaments. The prolongation is then continued down, and on the intervertebral substance between the fourth and fifth lumbar vertebræ terminates in the fourth lumbar ganglion.

IV. The fourth lumbar ganglion, on its outer side, gives a branch to the fourth lumbar nerve, and another dividing into two to the fifth; one of these however previously unites with the preceding branch. On its inner side it gives filaments to pass behind the iliac artery to the aortic plexus and ligaments. The prolongation is continued down, and at the beginning of the sacrum terminates in the first sacral ganglion.

I. The first sacral ganglion, on its outer side, sends a branch to the fifth lumbar and first sacral nerves. On its inner side it gives filaments to the ligaments and cellular membrane of the sacrum. The prolongation then passes down, and just below the inner side of the first sacral foramen forms the second sacral ganglion.

II. The second sacral ganglion, on its outer side, gives a branch to the first and second sacral nerves. On its inner side, it gives a branch to the hypogastric plexus, and filaments to the cellular membrane. The prolongation is continued downwards, and at the inner side of the second sacral foramen forms the third sacral ganglion.

III. The third sacral ganglion, on its outer side, gives a branch to the second sacral nerve. On its inner side it gives filaments to the cellular membrane. It sends two branches downwards to form the prolongation, and terminate at the inner side of the third sacral foramen in the fourth sacral ganglion.

IV. The fourth sacral ganglion, on its outer side, gives a branch to the third sacral nerve, and one to a branch of this nerve about to join the hypogastric plexus. On its inner side it sends a branch to communicate with the fourth sacral ganglion of the left side, and gives filaments to the ligaments and cellular membrane, and then at the inner side of the fourth sacral foramen terminates in the fifth sacral ganglion.

V. The fifth sacral ganglion, on its outer side, communicates with the fourth and fifth sacral nerves, and gives filaments to the ligaments. On its inner side it sends a branch across to join the fifth sacral ganglion of the left side. The prolongation then unites with the termination of the sympathetic of the left side in the single ganglion. This ganglion sends filaments to the ligaments and cellular membrane about the bone of the coccyx, communicates with the fifth sacral nerve, and forms an intricate plexus with filaments from the fourth, fifth, and sixth sacral nerves of each side.

THE LEFT SIDE.

THE prolongation having passed through the diaphragm, near the beginning of the second lumbar vertebra, terminates in the first lumbar ganglion.

I. The first lumbar ganglion, on its outer side, sends two branches to unite and terminate in the first lumbar nerve; a little lower down it gives off another branch to divide, and sends one branch to the first lumbar nerve, and the other to the second. On its inner side it sends two branches to the aortic plexus. The prolongation is then continued down, and on its outer side sends two branches to the third lumbar nerve, and at the upper part of the fourth lumbar vertebra terminates in the second lumbar ganglion.

II. The second lumbar ganglion, on its outer side, gives a branch to the fourth and another to the fifth lumbar nerve; the latter communicates with the prolongation, and gives filaments to the ligaments of the spine. On its inner side it gives small branches to pass behind the iliac artery to the aortic plexus; it gives filaments also to the ligaments, the iliac artery, and the ureter. The prolongation is then continued down, and at the beginning of the sacrum terminates in the first sacral ganglion.

I. The first sacral ganglion, on its outer side, gives a branch to the fifth lumbar nerve, and one to the first sacral, and filaments to the internal iliac artery. On its inner side it gives many filaments to the cellular membrane and the ligaments of the sacrum. The prolongation is continued downwards, and almost immediately terminates in the second sacral ganglion, near the middle of the first sacral foramen.

II. The second sacral ganglion, on its outer side, sends several branches to the first sacral nerve, and one downwards to the second. On its inner side it gives filaments to the cellular membrane. The prolongation is then continued down to terminate in the third sacral ganglion, at the inner side of the inferior part of the second sacral foramen.

III. The third sacral ganglion, on its outer side, gives a branch to the second sacral nerve. On its inner side it gives filaments to the cellular membrane, and a long branch to the hypogastric plexus. It then terminates in the fourth sacral ganglion, at the inner and superior part of the third sacral foramen.

IV. The fourth sacral ganglion, on its outer side, gives two branches to the third sacral nerve. On its inner side it gives filaments to the cellular membrane and ligaments, and sends a branch across to the fourth sacral ganglion of the right side. The

prolongation is then continued downwards, and at the inner side of the fourth sacral foramen terminates in the fifth sacral ganglion.

V. The fifth sacral ganglion, on its outer side, gives a branch to the fourth sacral nerve. On its inner side it sends a branch to the fifth sacral ganglion of the right side, a branch to the hypogastric plexus, and filaments to the cellular membrane. The prolongation, after sending a branch on its outer side to the fifth sacral nerve, is continued towards the middle of the inferior part of the sacrum, to unite with the termination of the prolongation of the right side in the single ganglion. This ganglion gives filaments to the cellular membrane and ligaments, and forms an intricate plexus with filaments from the fourth, fifth, and sixth sacral nerves of each side.

In some subjects five or six ganglia may be seen in the lumbar portion of each sympathetic nerve, and these will frequently be found thicker, but not so long as in the preparation from which this description was taken.

THE SPLANCHNIC NERVES.

THE RIGHT SIDE.

THE great splanchnic nerve is formed by a branch 82 P. III. from the fifth thoracic ganglion, joined by one 83 P. III. from the seventh, and another 84 P. III. from the eighth; it then passes down 85 P. III. and communicates with the lesser splanchnic nerve 86 P. III., and passes through the diaphragm 42 P. V. to terminate in the semilunar ganglion.

The semilunar ganglion 43 P. V. is placed partly on the aorta, and extends, either by its thick substance, or a membranous expansion, over the orgin of the cœliac and superior mesenteric arteries; some portions of it extend also over the emulgent arteries.

The lesser splanchnic nerve 86 P. III. is formed of a branch from the tenth thoracic ganglion, and another from the prolongation. It passes through the diaphragm on the outer side of the great splanchnic nerve, and terminates 44 P. V. in a portion of the semilunar ganglion giving origin to the emulgent plexus; another branch 87 P. III., arising by two others from the eleventh thoracic ganglion, passes through the diaphragm 45 P. V., and also terminates in the portion of ganglion connected with the emulgent plexus.

A small ganglion 46 P. V. receives a branch from the right semilunar ganglion, and also one 47 P. V. from the right phrenic nerve; it then gives several filaments to the renal capsule, and sends a branch 53 P. V., 4 P. VII. behind the hepatic vessels to join a branch of the left hepatic plexus, and distribute filaments about the inferior cava near its passage through the diaphragm.

The semilunar ganglion gives branches 76 P. V. to the renal capsule; several of these are very small, but others are of considerable size, and in some subjects the communication, or rather union of the substance of the renal capsule and semilunar ganglion 9 Fig. 1, and 4 Fig. 2, P. IX. is so very great, and so much more extensive than between the nerves and any of the other viscera, that it may be reasonably inferred that these bodies answer some very important purpose in the economy of the nervous system.

The right hepatic plexus 48. 49. 50. 51. 52 P. V., 19. 23. 24 P. VII., consists of a very intricate combination of nerves, surrounding the hepatic arteries and gall ducts. Many branches are given to it from the right semilunar ganglion, and also from the left, or rather the connexion of this with the membranous expansion 44 P. VI., forming part of the cœliac plexus; it communicates with the left hepatic plexus. Branches are sent from it to the gall bladder and its ducts, and the rest of it enters the liver, attached to the ramifications of the hepatic artery and the vein of the porta, to terminate in the substance of this organ. The nerves on entering the liver are first almost wholly connected with the hepatic arteries, but when these have divided into branches, some of the nervous filaments may be observed to pass from them upon the small ramifications of the vein of the porta.

From the right hepatic plexus branches 61 P. V., 21 P. VII. are sent along the pyloric artery to the stomach to communicate with branches 22 P.VII. from this plexus; also with a branch of the right or posterior trunk of the par vagum 14 P. VII. and a branch from the left or anterior trunk 2 P. VII. Other branches 22 P. VII. are sent to the stomach, and on branches of the pyloric artery to communicate with others from the left or anterior trunk of the par vagum and the left hepatic plexus; and some 20 P. VII. accompany the right inferior gastric artery to terminate on the stomach, and others 67 P. V. pass along a branch of this artery to terminate on the duodenum, where a union is formed with a branch 68 P. V. of the superior mesenteric plexus on a branch of the superior mesenteric artery; filaments are also sent to the duodenum and pancreas.

The left hepatic plexus 5. 6. 7. 8. 9. 10 P. VII. is principally formed of branches from the left or anterior trunk of the par vagum, and the branch 53 P. V., 4 P. VII. from the small ganglion 46 P. V., and the divisions 63. 64 P. VI., 11. 12 P. VII. of the branch 41 P. VI.; the branches pass along the lesser omentum to the porta, communicate with branches of the right hepatic plexus, and then enter the liver, and accompany into its substance the ramifications of the hepatic arteries and the vein of the porta.

The cœliac plexus 64 P. V., 44 P. VI., 17 P. VII. surrounds the cœliac artery in the form of a membranous sheath; it communicates freely with each semilunar ganglion, and on the left side with the large portion of the right or posterior trunk of the par vagum 83 P. VI. Branches are sent from this plexus along the splenic artery to the spleen and pancreas 45 P. VI., and along the left inferior gastric artery 46 P. VI. 25 P. VII. to the stomach. Branches are sent to the pancreas, and some to accompany the pancreatic artery 47 P. VI., 18 P. VII. Branches are also sent along the coronary artery to the stomach, and to communicate with the left hepatic plexus.

The superior mesenteric plexus usually surrounds the beginning of the superior mesenteric artery in the form of a membranous sheath 65 P. V.; it arises principally from the right semilunar ganglion, but communicates freely with the left and the cœliac plexus; the origin on the left side 50 P. VI. is connected with the termination of the right or posterior trunk of the par vagum in the cœliac plexus. From the superior mesenteric plexus many of the nerves, accompanying the branches of the superior mesenteric artery, are derived to be distributed on the small intestines and the mesentery; a branch 68 P. V. accompanying a branch of this artery passes to the duodenum to meet a branch from the right hepatic plexus 67 P. V. sent on a branch of the right inferior gastric artery. The branches of nerves accompanying the right and middle colic arteries are derived principally from the aortic plexus 3 P. VIII., but these have communications with branches of nerves, sent with some of the divisions of the superior mesenteric artery, and particularly its ileo-colic branches. It may be worth while to observe, that the whole of the small and a part of the large intestines are supplied by the superior mesenteric artery with blood, but the nerves accompanying this vessel arise from different sources; and by the arrangement 3 P. VIII. of the aortic plexus, nearly the whole of the large intestines receives nerves principally from this plexus, and its terminations in the hypogastric plexuses.

The emulgent plexus 77 P. V. is situated partly before and partly behind the emulgent artery; it communicates very freely with the right semilunar ganglion, and receives the lesser splanchnic nerves 86 P. III., 44 P. V., and the branch 87 P. III., 45 P. V. from the eleventh thoracic ganglion; it communicates freely with the aortic plexus, and accompanies the ramifications of the emulgent arteries in the substance of the kidney.

The spermatic plexus 78 P. V. arises by several branches from the emulgent plexus; it communicates with the aortic plexus, and gives a filament to the ureter, and passes down in several branches with the spermatic artery; it receives a communication from the hypogastric plexus by a branch sent with the vas deferens. The plexus becomes so interwoven with the blood-vessels as to make the dissection very difficult, and it at length becomes so intermixed with all the other parts composing the inferior portion of the spermatic chord, that it is almost impossible to trace its branches distinctly to their termination in the testicle.

The aortic plexus 69 P. V., 53 P. VI. is a combination of branches placed principally on the aorta; it communicates with the superior mesenteric plexus, and the portion of the semilunar ganglion giving branches to the emulgent plexus; also with the

left semilunar ganglion, and that part giving off the left emulgent plexus; a branch is sent from the prolongation below the first lumbar ganglion to one of its gangliform expansions; it receives a branch from the second, third, and fourth lumbar ganglia, and two branches from the first lumbar ganglion of the left side, and smaller ones from the second; it is connected with the nerves of the right renal capsule and the right hepatic plexus by the branch 71 P. V.; it communicates with the spermatic plexuses; it passes down and forms the inferior mesenteric plexus on the inferior mesenteric artery. In its course it gives many branches to terminate on the aorta, the iliac arteries, and the ureters, and filaments may be traced to the thoracic duct; it divides on the last lumbar vertebra into two portions, and forms the right and left hypogastric plexuses 79. 80 P. V., 57. 58 P. VI.

The inferior mesenteric plexus 75 P. V., 54 P. VI. is formed by branches from the aortic plexus; it sends off numerous branches to accompany the ramifications of the inferior mesenteric artery, and through the branch 7 P. VIII. communicates with branches from the part of the aortic plexus 3 P. VIII. accompanying the middle colic artery, and then terminates on the left side of the colon, the mesocolon, and the beginning of the rectum.

The right hypogastric plexus 79 P. V. passes into the pelvis, communicates with the second sacral ganglion, gives branches to the divisions of the internal iliac artery, and passes towards the posterior portion of the side of the bladder near the connexion of this with the rectum, and forms a very intricate union 81 P. V. with branches from the third and fourth sacral nerves 86. 87. P. V.; it here assumes the appearance of a thick membranous expansion, and then gives off very numerous branches to terminate on the rectum, bladder, ureter, vesicula seminalis, vas deferens, and prostate gland, and sends filaments to accompany the vas deferens and unite with the spermatic plexus in the chord.

THE LEFT SIDE.

The great splanchnic nerve is formed by a large branch 87 P. IV. from the fifth thoracic ganglion; it is joined by a smaller one from the sixth, and a larger branch 88 P. IV. and a small one from the seventh; it receives another large branch 89 P. IV. from the eighth; this is joined by a small one from the ninth, and a larger one 90 P. IV.

from the prolongation, just before it reaches the tenth thoracic ganglion; the nerve 91 P. IV. thus formed, passes through the diaphragm 38 P. VI., and terminates in the left semilunar ganglion.

The semilunar ganglion 39 P. VI. is placed partly on the aorta, and frequently extends either by its proper ganglionic substance, or a membranous expansion as in the right side, over the origin of the cœliac and superior mesenteric arteries, and some portions of it are also placed over the emulgent artery.

The lesser splanchnic nerve 92 P. IV. is given off by the tenth thoracic ganglion; it passes through the diaphragm 40 P. VI. on the outer side of the great splanchnic nerve, and terminates in the emulgent plexus.

The semilunar ganglion sends filaments to accompany the branches of the phrenic artery proceeding to the diaphragm, and the branch of this artery given to the cardiac portion of the stomach and the renal capsule. The branch 41 P. VI. also gives filaments to the renal capsule, and others to communicate with the left phrenic nerve, and sends a branch to divide 63. 64 P. VI., 11. 12 P. VII. and pass across the cardiac extremity of the œsophagus, and give filaments to this part, and then terminate in the left hepatic plexus. The communications between the left semilunar ganglion and left phrenic nerve are very insignificant in comparison with those of the right side.

The semilunar ganglion forms a communication with the termination of the right or posterior trunk of the par vagum in the cœliac plexus 44 P. VI., and from this as well as from the right portion of the cœliac plexus branches are sent along the splenic artery to the spleen and pancreas; branches 50 P. VI., 5 P. VIII., are also sent from this on the superior mesenteric artery to form part of the superior mesenteric plexus.

The left emulgent plexus 60 P. VI. is situated partly before and partly behind the emulgent artery; it communicates very freely with the left semilunar ganglion, and receives the lesser splanchnic nerve; it communicates also with the aortic plexus, and divides into branches to accompany the ramifications of the emulgent artery to terminate in the substance of the kidney.

The left spermatic plexus 61. P. VI. receives branches from the left emulgent plexus and communicates with the aortic plexus; it accompanies the spermatic artery, and, at the lower part of the spermatic chord, is joined by a branch from the hypogastric plexus accompanying the vas deferens; it gives a filament to the ureter; its branches become so intermixed with the blood vessels and other parts of the chord, as to make it very difficult to trace them to their termination in the testicle.

The left hypogastric plexus 58 P. .VI receives a small branch from the third sacral ganglion, and another from the fifth; it gives branches to the arteries and cellular membrane; it passes at the posterior part of the bladder, and forms an intimate connexion 59 P. VI. with branches 77. 78 P. VI. from the third and fourth sacral nerves; it here assumes the appearance of thick membranous expansion, and then gives off very numerous branches to terminate on the bladder, ureter, vesicula seminalis, vas deferens, and prostate gland, and also sends a branch with the vas deferens to join the spermatic plexus in the chord.

The spermatic plexuses in the female are nearly the same as in the male, and accompany the spermatic arteries to the ovaries, and give branches to these organs, the Fallopian tubes, the uterus, and the round ligaments.

In both male and female the hypogastric plexuses are very similar in their origin, course, and communication with the sacral and sympathetic nerves; in the female the principal difference consists in the terminations of their branches on the uterus, as well as the bladder and rectum.

THE

CEREBRAL NERVES.

To have given a satisfactory demonstration of all the unfoldings of the brain, would have extended this work too much beyond the limits originally prescribed; therefore, after some general observations, the description of the origin and course of the nerves will be entered upon, in the same manner as if the anatomy of the brain had immediately preceded it.

In examining the structure of the brain, the cineritious part will be found softer, and of a more delicate texture than the medullary; the latter has more the fibrous character of a nerve, as may be manifested by tearing a portion that has been steeped in alchol. The intimate structure of the whole brain is cellular, and the cerebral matter is deposited in the cells. The fabric of the membrane composing the cells is much more delicate than in the spinal chord, and therefore shown with greater difficulty, and particularly as the connexion of the cineritious part with the pia mater is so easily destroyed; the annular tubercle and the oblong medulla exhibit it in the most satisfactory manner. The cells, in which the medullary matter is deposited, are attached to the pia mater, and may be well compared with the cancellated portion of a bone originating from the more external shell. By putting pieces of the spinal chord divided longitudinally in a solution of potassa for twenty-four, forty-eight hours, or a longer period, the medullary matter becomes softened, and by gentle agitation in water forms a milky fluid; the structure of the remaining part, on being suspended in water, becomes developed, and exhibits a beautiful cellular appearance, with more or less of the medullary matter in its cells, according to the time that it has been subjected to the influence of the potassa. As soon as the desired quantity of the medullary matter has been removed, the preparation should be immediately suspended in alcohol. In the spinal chord, the roots of the nerves may be seen to extend into this cellular structure, and it is probable the same disposition exists in the brain.

The dura and pia mater are in some measure connected with the nerves: the first appears to form a sheath for them at their exit from the cranium, and then to become very thin, and lost on the outer surface of the neurilema; the second is continued in a very delicate membrane, constituting the connexion of the different fibrils, and forming a support for the blood vessels, and it seems most probable that this is continuous with the finer neurilema encircling each fibril of several of the nerves, after their escape from the cranium. The arachnoid membrane appears to be only loosely surrounding many of the nerves to their exit through the different foramina.

In preparing portions of brain for tracing the roots of the nerves, it is best to remove the pia mater and blood-vessels; but in doing this the utmost gentleness is required, as the attachments of several nerves are very easily destroyed. The parts are then to be placed in alcohol, and when sufficiently hardened, the cerebral matter, near the insertion of a nerve, is to be picked out with a pointed instrument, and very considerable nicety is required in following its roots even a short distance, as these soon begin to partake of the softness of the cerebral fibres, and to be with difficulty distinguished. It is believed that the roots of the nerves always originate in the cineritious matter, but there exists considerable doubt as to the correctness of this opinion. The firmness of the brain in some maniacs, and the strong attachment of the nerves, facilitate the dissection.

It is a generally prevailing opinion, that there is not only a constant uniformity in the nervous system as a whole, but an undeviating regularity in its ramifications in every subject; and however convenient the assurance of such a fact would be to those engaged in the pursuit of anatomy, yet for the real interests of science, it is far better that the truth should be inculcated, than the knowledge of the manifold resources in the extensive designs of nature, for any purpose or under any authority, should be either narrowed or veiled, by adopting a system founded on an assumed but mistaken simplicity.

A too partial notice of the observations of Mr. Hunter has tended to enforce this opinion; it is therefore necessary to quote the words of this distinguished anatomist, who seems to have considered that he had not at first clearly expressed himself on the subject: and his explanations in an accompanying note must have failed of removing the obscurity, on account of that peculiarity of style, which has, more or less, pervaded the whole of his writings, otherwise so great a misunderstanding could not have so long existed.

* "The general uniformity in course, connexion, and distribution, will lead us to suppose, that there may be some other purpose to be answered than mere mechanical convenience; and many of the variations which have been described in the dissections of nerves, I believe to have arisen from the blunders of the anatomist, rather than from any irregularity in their number, mode of ramifying, course, distribution, or connexion with each other."

† "Here, it is to be understood, I do not mean lateral connexion, such as two branches uniting into one chord and then dividing, or a branch going to a part either single or double, for still it is the same nerve; or whether a branch unites with another a little sooner or a little later, for still it is the same branch. Such effects may arise more from a variety in the shape of the bodies they belong to, than any variety in the nerves themselves."

After a careful examination of the preceding paragraph and its accompanying note, it may be reasonably inferred, that although Mr. Hunter believed there was a general uniformity in the distribution of the nerves, yet he at the same time intended to acknowledge that partial differences frequently occurred. But it is not necessary to rely on opinions drawn from the supposed construction of words, especially on a subject that admits of the fullest and most unanswerable elucidation by every one, who will take the trouble to investigate it thoroughly by dissection.

According to the experience of the author, very little difference will be seen in the origins of any of the nerves of the brain, except the sixth; the fibrils composing all the nerves may be thicker, or more or less numerous, but will be generally found proportionate with the size of the subject. All the nerves, with few exceptions, ultimately reach the organs for which they were destined. The mode of ramifying, if it be generally considered as the separation of the nerve into a requisite number of branches for supplying the usual organs, is not subject to very great variations; there may be more or fewer divisions of each nerve, taking place at uncertain distances, and these larger or smaller, according to their number, so that, generally speaking, with respect to their ultimate destination, the same amount of nervous matter is given to every part. The course of the nerves is seldom altered, except by some change of the surrounding parts.

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* Observations on the Animal Economy, by John Hunter, page 259.

† Note to the same, page 260.

The nerves of the senses never vary; and those of the orbit, except in some minute points, are generally constant. In one instance, after the fifth had terminated in the Gasserian ganglion, four trunks were given off instead of three, and each passed through a separate foramen in the skull; two of these belonged more particularly to the third trunk: the spheno-palatine ganglion, as well as the gustatory nerve before its division into branches, has no determinate size, otherwise much difference does not usually exist in the principal branches of the fifth nerve. Deviations very frequently occur in the facial nerve; its digastric branch, and that passing at the back of the ear, do not vary much, but its ramifications over the face are so different as to be seldom alike in two subjects. Many branches of the par vagum are different in almost every subject; all the usual parts are ultimately supplied with branches, but these are smaller and more numerous, or larger and fewer, and arising at uncertain distances; and there is the same variation in the junction of the branches of this nerve with those of the sympathetic; a deviation in the recurrent itself is rare, but not in respect to its branches. The branch termed the descending of the ninth, was given off by the par vagum on each side in one subject, but only on one side in another, and this variation is by no means uncommon. The substitution of one nerve for another, as in the instances of a branch of the par vagum for the descending portion of the ninth, and also its connexion with the cervical nerves, must prove that the par vagum and ninth do not differ in some of their functions. Although the sympathetic has many variations, yet it has a considerable degree of uniformity in every subject, inasmuch as its course is never interrupted, and it seldom fails of being connected with the cerebral and spinal nerves, at one part or other, either of its prolongation or ganglia; but it is of a larger or less size as respects its prolongation, and its ganglia and branches also vary both in size and number; and these, with an allowance for the difference produced by any particular disease at the time of death, are generally proportionate with the size of the organs supplied by them, although they have issued from ganglia and portions of the prolongation, that do not correspond in a given space in different subjects, or have formed more or fewer junctions with each other.

THE OLFACTORY, OR FIRST PAIR OF NERVES.

EACH nerve arises in three portions from the posterior margin of the anterior lobe of the brain; the external is the longest, and may be traced to the bottom of the fissure of Sylvius; the middle extends to that part anterior to the optic tract having so many perforations for blood-vessels; the internal is the shortest, and arises still more internally from the posterior margin of the anterior lobe; these united together form the nerve, which passes obliquely forwards in a furrow between some convolutions near the inner edge of the base of the anterior lobe. The external root in passing along the fissure of Sylvius has the appearance of a nerve, but the other two are more like continuations of the cerebral matter.

The nerve is flat, and soft; over the cribriform plate of the ethmoid bone, it becomes enlarged into a bulbous form, and sends off two sets of branches from its inferior surface; each branch passes through a separate perforation or canal in the cribriform plate, and becomes strengthened in its passage by a process of the dura mater. One set of the branches is distributed on the membrane covering the turbinated bones, and the other on that covering the septum. The nerves cannot be easily separated from the membrane by means of an instrument, but after carefully detaching the membrane from the bone, may be observed, with the naked eye, and more particularly with the aid of a magnifying glass, to ramify in a very beautiful manner on the surface to which the bone adhered; but it is presumed their ultimate termination is in fine villous points on the outer surface.

The branches are curiously distributed on the Schneiderian membrane, forming the exterior boundary of the nasal cavity; a few ramify on the anterior portion, but several, after dividing and again communicating, pass backwards, and are collected into a point at the posterior angle of the superior turbinated bone, and form a communication with a branch from the spheno-palatine ganglion. After this connexion, it must be presumed that branches are sent to the Schneiderian membrane covering the inferior turbinated bone and the rest of the exterior boundary of the nasal cavity, but these have not been satisfactorily traced.

If the Schneiderian membrane were merely a thin covering to the bone, like that of the sinuses, the atmosphere would press with so much force on it, as to impede the

functions of the delicate olfactory nerves, notwithstanding the means taken in the construction of the nose, for obviating as much as possible the effects of this powerful agent. But it is so contrived, that the blood-vessels, and particularly the veins, can produce such an erectile force as will not only effectually prevent any injury from this source, but at the same time put the membrane in that state of tension, best fitting the extremities of the nerves for receiving the odoriferous particles. In different subjects, a section made across the membrane, at the posterior part of the inferior turbinated bones, exhibits more or less a cellular or spongy structure; but in the horse, the sinuses or veins placed beneath it are so very capacious, as to put the intention of such arrangement beyond the possibility of doubt.

It can hardly be necessary to attempt to refute the doctrines, ascribing the sense of smell to the branches of the fifth, and not to the proper olfactory nerve; this cannot indeed of itself produce the sense, for it is necessary to have the apparatus of the nose perfect, and properly supplied with other nerves, for the purpose of giving it sensation, connecting it with the system generally, and controlling the action of its numerous blood-vessels. There is a very decided difference between the sense, and the common sensations independent of this in man and some animals; but in others there is such a modification of the olfactory nerve as approaches that of common sensation, and makes the two unnecessary. The terminations of all the nerves peculiar to the different senses are very thickly placed on the apparatus set apart for their reception; those, on the contrary, supplied from other sources, and producing common sensation, are very much inferior in size and number. It is not difficult to conceive, that the injury or destruction of the branches of the fifth may impair very much, or even destroy the sense of smell, because it is necessary for the performance of the functions of an organ to have all its parts perfect, and particularly the nerves supplying it. A slight injury of the nerve on one side of the finger will impair, so as almost to annihilate, the functions of the opposite one, although this had not received the slightest hurt; therefore, whilst the communications between the olfactory nerve and the fifth are existing, it cannot be surprising that the destruction of the former should interfere with the functions of the latter.

THE OPTIC, OR SECOND PAIR OF NERVES.

The thalamus of each optic nerve winds obliquely backwards and outwards, then downwards, inwards, and forwards, forming the optic tract; it appears to be composed of fibres passing longitudinally from its anterior extremity to the commissure, and of others extending laterally to the surrounding parts; but nearly opposite the middle of the crus of the brain, its anterior edge becomes quite detached, whilst its posterior adheres to that part surrounding the infundibulum, and forming the floor of the third ventricle. The tract with its fellow forms the commissure, and in this the fibres becomes so intermixed, that some pass from the right to the left, and others from the left to the right. From the commissure each nerve passes off, and proceeds over and rather to the inner side of the internal carotid artery, just before this reaches the brain; it is continued through the optic foramen of the sphenoid bone, and at this part becomes enveloped by the dura mater; it passes forward in the orbit, and enters the globe of the eye at the inner and posterior part, through the sclerotic and choroid coats; it there presents a small eminence, which becomes expanded into the retina, and proceeds to the circumference of the capsule of the crystalline lens. The exterior surface of the retina is surrounded by the choroid coat, and its interior by the hyaloid membrane containing the vitreous humour. In a fresh eye, a small transparent spot, having the appearance of a vacuity, may be observed on the retina; it has a yellowish border, and is situated in the axis, just on the outer side of the entrance of the optic nerve: for more particular information on this point, as well as on the separation of the retina into laminæ, and its disputed mode of termination, the reader is referred to those authors who have written expressly on the anatomy of the eye.

This nerve appears like a quantity of medullary matter compacted together: its structure differs from that of every other in being more white and firm, but less fibrous; it becomes still firmer after it has been enveloped by the dura mater and its fibrous structure is most easily demonstrated after a sufficient immersion in alcohol.

The retina affords the most striking demonstration of the general termination of a nerve, and does it in a manner so satisfactory, that little further can be desired: and it gives ample reason for concluding that the rest have a similar but modified termination. Although many of the nerves may be traced to form a membranous expansion,

yet these are so small in proportion to, and so much interwoven with their respective organs, as to leave the anatomist incapable of demonstrating to the same degree their ultimate termination.

THE COMMON OCULO-MUSCULAR, OR THIRD PAIR OF NERVES.

EACH nerve arises from the inner portion of the crus of the brain, near the union of this with the annular tubercle, and from the perforated portion between the mammillary bodies and the crura of the brain ; its origin may be traced in the direction towards that of the superior oblique oculo-muscular nerve. It is situated a little behind the termination of the internal carotid artery ; it passes through that portion of the dura mater, extending from the clinoid processes of the sphenoid bone to the petrous portion of the temporal, and enters the orbit at the superior lacerated orbital foramen of the sphenoid bone, and is closely connected with the superior oblique oculo-muscular nerve, and the first trunk of the fifth. Before entering the orbit, it sends a branch internally to communicate with filaments of the branch formed by the plexus from the abducent oculo-muscular nerve, and then pass to the levator muscle of the eye, whence a branch proceeds to the levator muscle of the upper eye-lid. The remaining part of the nerve is the continuation of the trunk, and divides to give a branch to the depressor muscle of the eye, one to the abductor, and one to the inferior oblique, and the lenticular ganglion.

The lenticular ganglion is situated on the exterior side of the optic nerve ; it is a small compact body, and resembles very much the ganglia of the sympathetic nerve. It generally has the appearance of being united with the branch given to the inferior oblique muscle, rather than of receiving a filament from this. It communicates with the nasal nerve of the first trunk of the fifth, and sends off several filaments, termed ciliary nerves, to pass along the optic nerve, and pierce the sclerotic coat, and continue their course a little way on the inner surface of this, and then pass on the choroid coat to be principally distributed on the iris. The branch of the first trunk of the fifth joining the ciliary ganglion, appears to communicate with the plexus of the sympathetic nerve on the internal carotid artery.

The fibrils of the common oculo-muscular, at their origin, are not quite so coarse as those of the fifth, but become more close and firm in the passage of the nerve through the partition formed by the dura mater.

THE SUPERIOR OBLIQUE OCULO-MUSCULAR, OR FOURTH PAIR OF NERVES.

Each nerve arises from that portion of the process, extending from the cerebellum to the testis, to which the valve of Vieussens is attached; it passes downwards and forwards over the crus of the brain; and then through the portion of dura mater forming the partition extending from the clinoid processes of the sphenoid bone, to the petrous portion of the temporal, and enters the orbit at the superior lacerated orbital foramen of the sphenoid. It passes on the exterior side of the common oculo-muscular, and just above the first trunk of the fifth, and at this part a close connexion exists between it, the first trunk of the fifth, and the common oculo-muscular nerve; it then crosses obliquely over the supra-orbital nerve, but, before doing so, gives off the lachrymal; it then gives some minute filaments to the cellular membrane, and terminates in the superior oblique muscle.

The lachrymal nerve is formed by a branch from the superior oblique oculo-muscular, and the supra-orbital nerve; it gives filaments to the lachrymal gland, and then communicates with the temporal branch of the malar from the second trunk of the fifth, and terminates in the conjunctive membrane, and the skin of the upper eye-lid.

It resembles the common oculo-muscular in texture, but is so small as hardly to admit of a comparison with the other nerves.

THE THREE-FOLD, OR FIFTH PAIR OF NERVES.

The fibrils of each nerve are thicker at their origin than any other arising from the brain, and resemble very much in structure those composing the posterior bundles of the spinal nerves. The nerve of each side consists of two portions, the anterior or

smaller, and the posterior or larger. The anterior or smaller portion arises from the anterior edge of the part of the crus of the cerebellum joining the annular tubercle. The posterior or larger portion arises partly from the exterior, and partly from the interior of the part of the crus of the cerebellum joining the annular tubercle; its superior surface is broad, and becomes gradually narrower as it extends backwards; its narrow part, on reaching the restiform body, is continued into part of the auditory nerve. There is an appearance as if the fibres of the crus of the cerebellum separated for affording egress to the part of the nerve arising from its interior structure, and joined again near the annular tubercle. The two portions are not separate from each other at their origins from the brain, in the same distinct manner as the anterior and posterior bundles of the spinal nerves are from the two surfaces of the spinal marrow.

The two portions, at a short distance from their origins, enter the process of the dura mater, extending from the clinoid processes of the sphenoid bone to the petrous portion of the temporal; and beneath the exterior part of this membrane, the posterior forms the Gasserian ganglion, and contracts a close adhesion with the dura mater. The anterior portion does not enter into the composition of this ganglion, but passes behind, or rather on the inner side, and goes out at the oval foramen entirely with the third trunk; it, however, adheres to the ganglion, and becomes united with the third trunk, after this has left the ganglion, so that it does not pass to its termination entirely as a separate nerve, neither is it so much intermixed with the third trunk, as the anterior bundle is with the posterior in a spinal nerve.

The structure of the Gasserian ganglion is not the same as that of the sympathetic and spinal nerves; it differs from the former in not having the same close and homogeneous appearance, and from the latter in being less firm, and preserving much more the appearance of a plexus of nerves. Each anterior and posterior bundle of the spinal nerves is enveloped in a distinct sheath of dura mater, but the two portions of this nerve have not the same separation; at least, if it exists in the human subject, it is too delicate to be easily seen.

The Gasserian ganglion divides into three trunks: the first is the smallest, and enters the orbit at the superior lacerated foramen of the sphenoid bone; the second is larger than the first, and passes through the round foramen; and the third is the largest, and passes through the oval one.

As some of the roots of the posterior portion of the fifth proceed from the crus of the cerebellum, in the same manner as those of the anterior, it may be justly concluded, that

if the anterior be a muscular nerve on account of its origin, part of the posterior must be so likewise. Why the anterior portion does not enter into the Gasserian ganglion must at present remain a matter of conjecture. It is possible for some of the branches proceeding from the ganglion, and also the anterior portion, to be for exciting muscular action, and separate qualities may be required for the several parts which have to perform such varied functions. It is presumed that the branches of the posterior portion must be entirely for sensation, because these terminate very much on the skin; but it appears very probable that the skin is possessed of a modified muscular power, and may therefore require that its nerves should be capable of exciting this, as well as giving the faculty of sensation.

THE FIRST TRUNK OF THE THREEFOLD, OR FIFTH PAIR OF NERVES.

Just before it passes into the superior lacerated foramen of the orbit, it crosses over the common oculo-muscular nerve, and divides into the supra-orbital and nasal nerves.

The supra-orbital gives a filament which joins the branch from the superior oblique oculo-muscular, to form the lachrymal nerve. It then passes along the superior surface of the orbit on the levator muscle of the eye-lid, and gives some filaments to the cellular membrane: it goes through the notch in the frontal bone, and divides into branches; one passes outwardly to distribute filaments to the orbicular muscle of the eye-lids, and communicate with a branch of the facial nerve; several other branches pass at first principally underneath the occipito-frontal muscle, give filaments to this, and then take their course between its tendinous expansion and the scalp, and, near the occiput, reach the extremities of the occipital branch of the first cervical nerve, and communicate with these by very minute filaments. Just before leaving the orbit, it sends off a considerable branch to pass out at the inner angle of the eye, distribute filaments to the corrugating muscle of the eye-brow and the surrounding skin, and anastomose with a branch of the nasal nerve.

The nasal nerve is given off underneath, and rather to the inner side of the supra-orbital. It sometimes communicates with the smallest division of the common oculo-muscular nerve. It gives one or two branches to the lenticular ganglion; it then

proceeds inwards, crossing the optic and common oculo-muscular nerves, and sends filaments along the optic, sometimes to terminate on this, and sometimes to send a branch into the globe of the eye, to be distributed on the choroid coat and the iris: filaments, which have communicated with a plexus from the abducent oculo-muscular nerve, are given to the cellular membrane at the origin of the levator muscles of the eye and upper eye-lid; it then passes to the nasal side of the orbit, and sends a branch across and beneath the superior oblique muscle, and enters the anterior foramen leading to a passage through the ethmoid cells, and thence underneath the dura mater, through a perforation in the cribriform plate, to divide into two branches: one to be distributed on the Schneiderian membrane of the septum, the other to pass down on the posterior part of the bone of the nose, and insinuate itself between this and the cartilage, to be distributed on the skin near the ala, and unite with a branch of the infra-orbital nerve. Another branch communicates with a branch of the supra-orbital nerve, gives filaments to the periosteum of the orbit, to the lachrymal sac, and other parts about the inner angle of the eye, and communicates with a branch of the infra-orbital nerve.

THE SECOND TRUNK OF THE THREEFOLD, OR FIFTH PAIR OF NERVES.

It passes through the round foramen of the sphenoid bone, and immediately gives off the malar nerve.

The malar nerve enters the inferior lacerated foramen, passes to the exterior side of the orbit, in a process of the investing membrane, and divides into two branches; the temporal and malar. The temporal branch divides into two; one of these passes through a small canal, formed at the junction between the superior orbital process of the malar bone and the external angular process of the frontal, and then through some fibres of the temporal muscle, and communicates with the temporal branches of the facial nerve, penetrating through the temporal fascia; the other goes forward to the lachrymal gland, and communicates with the lachrymal nerve, and terminates in the conjunctive membrane and skin of the upper eye-lid. The malar branch proceeds nearly at the bottom of the exterior side of the orbit, and goes through a foramen

in the malar bone to communicate with the facial nerve, and terminate in the surrounding skin.

The trunk passes forwards, and gives one or two branches to the spheno-palatine ganglion; it then continues its course in a groove between the antrum and orbit, but just at the posterior and external edge of the antrum, sends off one or two dental branches; these give filaments to the periosteum, &c., on the exterior of the antrum and to the gums, pass into a groove formed by the bone of the antrum and that portion terminating a little lower in the alveolar processes, then become united to form the first dental nerve, and accompany a branch of the internal maxillary artery, to be joined by the second a little further on. The trunk now enters the canal between the antrum and orbit, and then gives off the second dental nerve to pierce the bone of the antrum, pass on the outside of the membrane lining this, and unite with the junction of the two preceding: minute filaments are given off by the nerve thus formed to the molar and bicuspidated teeth: further on, a third dental nerve goes through the bony shell of the antrum, and having passed a short distance, and given filaments to the exterior surface of the membrane lining this cavity, enters a groove of the superior maxillary bone, communicates with the trunk formed by the preceding dental nerves, and then passes obliquely downwards and forwards, distributing filaments to the alveolar processes, and the cuspidated and incisive teeth.

The trunk now passes out at the infra-orbital foramen, and immediately sends off a branch, to be chiefly distributed on the gums about the bicuspidated, cuspidated, and incisive teeth; it sends upwards a branch to the lower eye-lid, and then divides into several considerable branches, which diverge on descending, and are distributed to the buccal glands, to the muscles and skin of the upper lip, and the skin of the nose, and communicate with branches of the facial nerve, and the nasal branch of the first trunk near the ala of the nose.

The spheno-palatine ganglion varies in different subjects, being sometimes the size of a small pea, and at others almost without any ganglionic appearance; it is situated at the posterior and superior part of the antrum, and between this and the pterygoid process of the sphenoid bone; it sends filaments upwards, to be distributed to the cellular membrane, &c., at the back of the orbit, and to communicate with the abducent oculo-muscular nerve. It sends a branch, usually called the Vidian nerve, backwards through the pterygoid canal, generally to divide into two others; the superior passes behind the third trunk of the threefold, and enters the cavity of the cranium underneath

the dura mater, or rather in a sheath of this membrane, to join the facial nerve at the anterior surface of the petrous portion of the temporal bone, and at this part sometimes to communicate with a filament of the tympanine branch of the glosso-pharyngeal; the other branch passes into the carotic canal and communicates on the internal carotid artery with the branches of the abducent oculo-muscular joining the first cervical ganglion, and thus forming what is usually termed the origin of the sympathetic nerve. It sends off small branches to communicate with the olfactory nerve, near the posterior angle of the superior turbinated bone. Some filaments pass inwards to the Schneiderian membrane covering the septum; and one of these in particular is continued downwards and forwards on the surface of the membrane next the septum, and then through the incisive foramen, to terminate on the palate, and anastomose with a branch of the palatine nerve near the front incisive tooth. It sends off the palatine nerves, which generally consist of three or four branches; a branch is given from one of these to divide into two others, and then pass through the apertures in the pterygoid process to the Schneiderian membrane forming the exterior surface of the nasal cavity; lower down a smaller branch is likewise given to this membrane. One or two of the palatine nerves usually pass downwards and backwards through apertures in the palate bone, or at the junction of this with the pterygoid process of the sphenoid, to be distributed to the soft palate, and the termination of the levator muscle; the other two likewise pass downwards in the canal, and divide into branches, to be distributed on the roof of the mouth, and anastomose, near the front incisive tooth, with the branch continued through the incisive foramen.

THE THIRD TRUNK OF THE THREEFOLD, OR FIFTH PAIR OF NERVES.

It passes through the oval foramen of the sphenoid bone, and divids into five principal nerves. But before describing these, it will be necessary to speak of the anterior portion of the fifth accompanying it.

The anterior portion appears to consist of four principal fibrils; the most anterior passes down, and after becoming connected with the Gasserian ganglion, goes to the part of the branch chiefly terminating in the temporal muscle; the second, towards its most inferior part, likewise gives a filament to the same deep temporal branch; the

rest of the second fibril and the third are given to the buccal nerve, and the fourth joins the gustatory.

The deep temporal nerve passes externally, and gives a branch to be joined with the first and part of the second fibril of the anterior portion, and then distributed to the temporal muscle; it communicates with the branch of the facial nerve joining the temporal branch of the malar by filaments which pierce the temporal muscle; the rest of the nerve passes just anterior to the condyle of the lower jaw, and proceeds downwards, to terminate in the masseter muscle, after giving filaments to the capsular ligament of the lower jaw: sometimes this joint is supplied by the superficial temporal.

The superficial temporal nerve is formed of two branches; it passes behind the condyloid process of the lower jaw; it sends a filament on the external carotid artery, to anastomose with filaments from the sympathetic, and with one from the inferior dental passing on the internal maxillary artery; it communicates with the facial nerve by three branches, and gives filaments to the membrane lining the external auditory meatus, and the skin at the anterior part of the ear, and mounts up to the temple, to terminate on the skin of this part.

The inferior dental nerve, the continuation of which forms the inferior maxillary, descends between the two pterygoid muscles, and sends a filament on the beginning of the internal maxillary artery to communicate with the filaments of the sympathetic nerve, ramifying on the internal carotid artery, also with the other branches from the spheno-palatine ganglion, passing on the internal maxillary artery; it sends a branch downwards for some distance in a groove in the lower jaw, to pass, just before the anterior corner of the submaxillary gland, to which it gives a small branch, and then between the mylo-hyoideal muscle and the maxillary portion of the digastric, and divides and terminates in these muscles. The inferior dental nerves, accompanied by the dental artery, passes into the aperture at the superior and posterior part of the lower jaw, and, almost as soon as it has entered this, sends a branch downwards, which gives a filament to the posterior fang of the second molar tooth and passes forward round the superior part of the same fang, to terminate in the cancellated structure. It then proceeds just beneath the fangs of the teeth, and gives a filament to each fang of the molar, and the second bicuspidated; it sends a branch forward to give a filament to the first bicuspidated, the cuspidated, and incisive teeth, and then passes out at the foramen near the chin, and after communicating with the facial nerve, terminates in the buccal glands, the muscles, and skin of the lower lip and chin.

The buccal nerve appears to be principally formed of the third fibril, and part of the second of the anterior portion of the fifth; it gives branches to the temporal and

external pterygoid muscles, and then passes close to the inner surface of the coronoid process of the lower jaw; in its course some filaments are distributed to the membrane lining the mouth, and after emerging from behind the masseter muscle, it communicates with the facial nerve, sends filaments on the facial artery to join others from the sympathetic nerve, and then terminates in the buccal glands, the muscles, and skin at the side of the mouth. Near the part whence the buccal nerve arises, filaments are given to the circumflex muscle of the palate.

The gustatory is at first so connected with the inferior dental, as to appear part of the same nerve. It receives the fourth fibril of the anterior portion, and is joined by the chord of the tympanum just after it has separated from the inferior dental; it then communicates with this nerve; it passes at first between the internal and external pterygoid muscles, and to the former of these gives a filament; it then passes just behind the last molar tooth, underneath the membrane of the mouth, giving filaments to this, and winding over the superior edge of the submaxillary gland, expands into a broad and flat nerve, which frequently assumes a ganglionic appearance; it gives many filaments to the submaxillary and sublingual glands, and to the membrane situated between the outer edge of the tongue and lower jaw; it communicates with the ninth nerve, and, in passing over the insertion of the hyo-glossal muscle, divides into several branches, which proceed by the exterior side of the lingual artery between the insertion of the genio-hyo-glossal and lingual muscles, then subdivide into smaller branches, pass through the delicate muscular fibres composing the superficial part of this organ, and terminate in a villous form on two-thirds of the anterior portion of the external surface. It is difficult to decide whether some filaments, in penetrating through this fine muscular structure of the tongue, do not partly terminate on it.

The chord of the tympanum gives filaments to the surrounding membranous structure, and then enters a canal by the fissure of Glaser; it gives filaments in its course, and particularly about the membrane of the tympanum, and the laxator and tensor muscles; it passes over the handle of the hammer to be joined to the facial nerve, just before this emerges from the stylo-mastoid foramen. It is supposed that the chord of the tympanum does not unite with the gustatory nerve, but passes in mere contact with this; but if a preparation that has been kept in spirits be carefully examined with a magnifying glass, and at the same time an attempt be made to disunite these nerves, it will be found that the filaments of both are intermixed, and cannot be separated without violence.

THE ABDUCENT OCULO-MUSCULAR, OR SIXTH PAIR OF NERVES.

EACH nerve arises partly from the anterior extremity of the pyramidal body, and partly from the posterior edge of the annular tubercle, but sometimes entirely from the former: it enters the cavernous sinus, and passes close to the exterior side of the internal carotid artery; at first it is quite beneath the other nerves entering the orbit; it then passes on the outer side of the common oculo-muscular nerve, to part of which it firmly adheres, and enters the orbit by the superior lacerated foramen of the sphenoid bone, and terminates in the abductor muscle of the eye.

At its origin it resembles the common and superior oblique oculo-muscular nerves, but, in the cavernous sinus, assumes a more open texture. In passing close to the internal carotid artery, it sends obliquely upwards some filaments, which form a plexus with others arising from the portion of the Gasserian ganglion giving origin to the nasal nerve, to be distributed on the coats of the internal carotid artery and the pituitary gland. A little more forward it sends several other considerable filaments to form another plexus on, and become intimately connected with, the common oculo-muscular nerve; this communicates with the preceding plexus, receives a filament from the nasal nerve, and a branch from the spheno-palatine ganglion, passing first upwards, and then backwards, on the exterior of the sphenoidal sinus, and communicating particularly with one of the filaments sent from the abducent oculo-muscular nerve. After these connexions a considerable branch proceeds from the plexus to communicate with the smallest division of the common oculo-muscular nerve, also with the nasal, and one of the branches of this given to the lenticular ganglion; it gives some filaments to the cellular membrane about the optic nerve, and then terminates in the levator muscle of the eye.

It sends several filaments to the dura mater behind the Gasserian ganglion. As it crosses the internal carotid artery, it forms an intricate belt-like plexus, which appears almost like part of the nerve, and sends downwards a considerable branch anteriorly and posteriorly, communicating by small cross filaments; the anterior in descending gives filaments to the lining of the carotic canal, communicates with the inferior branch of the Vidian nerve, then goes obliquely behind the internal carotid artery, and, having passed out of

the carotic canal, joins the posterior branch ; this in descending, also gives filaments to the membrane lining the carotic canal, and then unites with the branch of the Vidian nerve ; it receives the tympanine branch of the glosso-pharyngeal, and, after this union, passes behind the internal carotid artery, and joins the anterior branch in the first cervical ganglion of the sympathetic nerve.

THE AUDITORY, OR SOFT PORTION OF THE SEVENTH PAIR OF NERVES.

THE seventh pair on each side consists of two nerves: the auditory or soft portion, and the facial or hard portion. A great difference in the texture of these is supposed to exist ; but, from the brain to the bottom of the internal auditory meatus, their fibrous appearance is nearly the same, although the auditory is not quite so firm as the facial.

The beginning of the auditory nerve appears in the fourth ventricle, as a slight transverse rising ; this flat portion then passes downwards and forwards over the restiform body, from which, and the posterior part of the crus of the cerebellum, it receives additional fibrils ; and some of these appear to communicate with the origin of the fifth in the restiform body. Towards the inner or median side of the auditory, some stronger fibrils arise, usually termed the middle portion, between the auditory and the facial, but eventually terminate in the facial.

Each nerve enters the internal auditory meatus, with the middle portion and the facial nerve. It divides into two principal portions : one passes into the cochlea by innumerable filaments, through perforations in the modiolus, and, by the aid of a magnifying glass, is seen to form an elegant network on the spiral lamina and the modiolus, and furnishes a beautiful example of the termination of a nerve, as exhibited in a more fibrous expansion than that of the optic in the retina ; the other portion divides into three principal branches, which enter the vestibule, and subdivide to be distributed on the membranous lining of the semicircular canals and the vestibule.

After carefully dissecting the labyrinth in a great many subjects, the membranous semi-circular canals have sometimes been observed as detached tubes, but at others as having acquired some connexion with the periosteum lining the canals ; and the same difference has also been noticed in the vestibule : and it is conceived that the nerves,

notwithstanding this difference, may be capable of performing their functions equally with those on the modiolus and spiral lamina of the cochlea.

The auditory nerve differs from the olfactory in being firmer, whiter, and more fibrous; and from the optic in being also more fibrous, but much less firm.

THE FACIAL, OR HARD PORTION OF THE SEVENTH PAIR OF NERVES.

EACH nerve appears to arise from the posterior part of the annular tubercle, and the oblong medulla, deep in the fissure between the posterior part of the annular tubercle and the olivary body; it passes into the internal auditory meatus on the inner side of the auditory nerve, and here a distinct nervous communication is formed between this, the middle portion, and the auditory, and cannot be broken through without violence. It enters the aqueduct of Fallopius, and, on the outer surface of the petrous portion of the temporal bone, receives the superior branch of the Vidian nerve; it passes downwards and backwards, and, just before leaving the skull, is joined by the chord of the tympanum; it then passes out of the stylo-mastoid foramen, and divides into numerous branches: but, before describing these, it is necessary to say a few words respecting the chord of the tympanum, and the superior branch of the Vidian nerve.

At the aqueduct of Fallopius, the superior branch of the Vidian appears to enter intimately into the composition of the facial nerve, for this becomes larger immediately after the union, and assumes the appearance of a ganglion of the sympathetic nerve, inasmuch as it is then firmer, and much less fibrous. The termination, too, of the chord of the tympanum appears to enter into the composition of the facial nerve.

Soon after entering the aqueduct of Fallopius, it gives a branch to the tensor muscle of the tympanum, and in passing backwards, sends a filament to that of the stirrup; as soon as it has left the stylo-mastoid foramen, it sends off a branch to divide into two; one to pass to the back of the auricle, and give filaments to the retracting muscles, the other to the attollent muscle of this part.

The digastric branch enters the superior belly of the digastric muscle, gives filaments to this, and then passes between some of its fibres, to communicate with the glosso-

pharyngeal nerve, and send a slender branch to the stylo-hyoideal muscle, and some filaments to join others from the sympathetic nerve on the external carotid artery.

The trunk now forms two principal divisions, which are situated deeply in the parotid gland; the superior is much the largest, and supplies the parts above the angle of the mouth, the inferior supplies the parts below. Communications in the upper division are formed with the superficial temporal nerve of the third trunk of the fifth, with the supra-orbital and infra-orbital nerves, and the buccal of the third trunk of the fifth, after this has passed from behind the masseter muscle. Communications in the lower division are formed with the buccal, and the termination of the inferior dental, after this has emerged from the foramen near the chin; with branches of the second cervical nerve, near the angle of the jaw, and with branches of the sympathetic, on the external carotid artery. The trunk of the first division sometimes divides into two or three branches, and these sub-divide, and form very numerous junctions; sometimes it becomes a flat expansion, and all at once divides into six or seven branches. The trunk of the second division separates into three or four branches; these also communicate freely with each other, and with those of the first division.

Sometimes two, sometimes three, of the ramifications of the principal branches of the superior division pass over the zygomatic arch to the temple, and appear to terminate in the occipito-frontal muscle; others go forward to the orbicular muscle of the eye-lids, and communicate with the supra-orbital nerve. Sometimes one large branch, or two or three of a less size, pierce the fascia covering the temporal muscle, and when more than one, join under the fascia, and pass behind the malar bone to communicate with one of the temporal branches of the malar nerve, passing through a small canal formed at the junction between the superior orbital process of the malar bone, and the external angular process of the frontal, and also with the deep temporal branch of the third trunk of the fifth. The rest of the superior division is formed of several considerable branches, which pass across the face, and give branches to the orbicular muscle of the eye-lids, and the zygomatic muscles, then pass behind these, and send a branch towards the inner angle of the eye, giving filaments about this part, and communicating with a filament of the nasal branch of the first trunk of the fifth; filaments are also given to the fat and skin, and some of the branches then join several from the infra-orbital nerve, and the rest are distributed on the muscles of the upper lip. There is an intimate connexion between some of the branches of the facial and infra-orbital nerves, and the latter are increased in size by the union.

The inferior portion generally divides into four or five principal branches. The first is chiefly distributed to the muscular structure about the angle of the mouth, and communicates with the buccal branch of the third trunk of the fifth, when this has passed beyond the masseter muscle. The second and third, but sometimes only the second, pass towards the chin, and are distributed on the muscles of the lower lip and the cutaneous muscle, and communicate with the continuation of the inferior dental nerve, after this has passed through the foramen near the chin. The fourth and fifth, after communicating with branches of the second cervical nerve beneath the cutaneous muscle, are distributed to this and the skin.

It may be remarked, that several branches are distributed to the fat and skin of the face: these are very minute, and with difficulty traced far into the substance of the skin. except at the angle of the jaw, and after a connexion with branches of the second cervical nerve.

A more copious description of the branches of this nerve might have been given, but its very numerous ramifications are so different in different subjects, that it appeared better to state their general disposition, rather than attempt to display that degree of minuteness which could not answer any useful purpose.

THE PAR VAGUM, PNEUMO-GASTRIC, OR EIGHTH PAIR OF NERVES.

Each nerve arises from the restiform body by the side of the groove between this and the olivary body, and just below the origin of the glosso-pharyngeal nerve: it passes out of the posterior lacerated foramen at the base of the skull, and is continued downwards on the outer side of the external carotid artery. It is united with the ninth and the sympathetic principally by condensed cellular membrane, but at its superior portion by an intermixture of nervous filaments. After immersing the subject in alcohol, and carefully removing the cellular membrane, the nervous communications may be preserved.

THE RIGHT SIDE.

It passes down at first behind the ninth, on the exterior side of the internal carotid, and then of the common carotid artery, and to the inner side, or rather behind the internal jugular vein. At the bottom of the neck, it passes between the subclavian artery and vein to the back of the lung, and from thence on the œsophagus to the stomach.

Soon after leaving the cranium, and near its junction with the ninth, it gives off the superior laryngeal nerve. This passes down behind the internal carotid, and crosses posteriorly this artery and the external carotid; it communicates with the pharyngeal plexus, and proceeds between the hyoid bone and thyroid cartilage to give many filaments to the membrane covering the epiglottis, and the superior part of the larynx. It sends a branch downwards, behind the posterior surface of the thyroid cartilage, near the crico-thyroid and lateral crico-arytenoid muscles, to give filaments to the membrane lining the thyroid cartilage, and sometimes anastomose with a branch from the recurrent. It sends a branch obliquely downwards and backwards over the situation of the arytenoid cartilage; this gives filaments to the membrane extended between the epiglottis and the arytenoid cartilage, and others, to pierce the fibres of the oblique and transverse arytenoid muscles, and is then continued in the exterior angle formed by the origin of one, and the insertion of the other oblique arytenoid muscle, and passes underneath the transverse arytenoid, to meet the same branch of the left side, and terminate on the membrane at the posterior part of the rima of the glottis; it gives also filaments to the posterior crico-arytenoid muscle, and then terminates by anastomosing with a branch of the recurrent. There is great difficulty in determining whether some of the filaments terminate on the posterior crico-arytenoid and the oblique and transverse, or altogether pass through the fibres of these muscles, as the greater number can be traced to the membrane about the glottis, and that covering the cartilages.

A little below the turn of the ninth towards the tongue, it gives off the external laryngeal nerve; this is particularly connected with the superior laryngeal nerve and the pharyngeal plexus, and generally communicates with the lateral cardiac plexus, and terminates on the inferior constrictor muscle of the pharynx and the crico-thyroideal. The trunk soon after sends off several branches, which unite and give a branch to the

sterno-thyroideal muscle, and then pass over the subclavian artery to the part of the lateral cardiac plexus terminating in the great cardiac nerve; near the bottom of the neck it gives another branch to the lateral cardiac plexus. In its course down the neck it gives many filaments to the condensed cellular membrane on the anterior part of the spine.

It passes over the beginning of the subclavian artery, and gives off the recurrent nerve. This winds round the posterior part of the subclavian artery, and then sends a branch to the plexus on this vessel; it sends a branch downwards to the œsophagus; it gives several filaments to the trachea and œsophagus, and one to the thyroid gland; it next passes under the exterior border of the inferior constrictor muscle of the pharynx, to the inner or posterior surface of the thyroid cartilage; it either gives, or sends up a branch to give filaments to the membrane covering the beginning of the œsophagus, and the inferior part of the pharynx, and anastomose with one descending from the superior laryngeal nerve; it gives filaments to the posterior crico-arytenoid muscle, and the membrane covering the posterior surface of the cricoid cartilage; it then sends a branch to pass behind this muscle, and over the articulation of the cricoid and arytenoid cartilages, to terminate in the oblique and transverse arytenoid muscles; it sometimes again anastomoses with a branch of the superior laryngeal, and then at the posterior and exterior edge of the cricoid cartilage divides into branches, which terminate in the lateral crico-arytenoid and the thyro-arytenoid muscles.

Just below the subclavian artery a tuft of branches is given off; several of these pass to the part of the lateral cardiac plexus terminating in the great cardiac nerve, and two to the anterior pulmonary. It next sends off two branches to unite and give a filament to the trachea, and terminate in a branch passing to the œsophagus; another branch is then given off, which communicates with the anterior and posterior pulmonary plexuses and again with the trunk, gives branches to the œsophagus, and then joins others lower down on this canal. A considerable branch is next sent to the anterior pulmonary plexus; lower down a branch, after communicating with the preceding and another branch given to the anterior pulmonary plexus, terminates on the anterior part of the lung, and the branches of the right division of the pulmonary artery and vein. It now winds behind the right branch of the trachea in a flattened form, and gives off several branches, constituting the posterior pulmonary plexus; this communicates with the thoracic plexus, and gives many filaments to the cellular membrane and absorbent glands, but the principal part of the ramifications accompanies the branches of the trachea to

their terminations in the air cells, and the rest on the branches of the pulmonary artery and veins. After giving off the posterior pulmonary plexus, it distributes filaments on the posterior mediastinum ; two branches 70. 70 P. III. are next sent to the œsophagus, and to communicate with one of the left trunk 80 P. IV.; it then divides into three principal branches 71. 72. 73 P. III.; the latter divides, and gives off 74 P. III. to join the large nerve 75 P. III. proceeding from the union of the branches 81 and 82 P. IV. of the left side, and form the left or anterior trunk; the branches 71. 72. 73. P. III. then turn round to the left side of the œsophagus to be 84. 85. 86 P. IV., and join the branch 83 P. IV. of the left, to form the right or posterior trunk 1 P. IV., 1 P. VI. After this has passed through the diaphragm, it gives filaments to the cardiac extremity of the œsophagus, some of which communicate with similar ones from the left trunk ; it sends a branch 82 P. VI. to terminate on the posterior surface of the stomach after giving a branch 87 P. VI to the splenic plexus; it sends a branch 85 P. VI. 15 P. VII. to terminate on the lesser curvature of the stomach; it gives a branch 84 P. VI., 14 P. VII., to communicate with branches of the left or anterior trunk on the superior gastric artery, and others from the part of the right hepatic plexus, 21 P. VII. on the pyloric artery to terminate on the stomach ; it sends branches 86 P. VI. to communicate with those from the cœliac plexus accompanying the superior gastric artery. The continuation or principal part of the trunk 83 P. VI. then passes downwards, and terminates in the cœliac plexus 44 P. VI.

THE LEFT SIDE.

Almost as soon as it has left the cranium, it gives off the superior laryngeal nerve, but as the distribution of this is nearly the same as on the right side, it is not necessary to describe it. A little lower down, it communicates with the superior laryngeal nerve and the pharyngeal plexus. The external laryngeal nerve is given off from the superior laryngeal; it communicates with the first cervical ganglion of the sympathetic and the lateral cardiac plexus, and sends branches across the posterior part of the carotid artery to the inferior constrictor muscle of the pharynx and the crico-thyroideal. A branch is then given from the trunk to the lateral cardiac plexus, and several slender filaments to the carotid artery and the condensed cellular membrane forming its sheath. It next passes over the arch of the aorta, and gives a branch to form part of the ante-

rior pulmonary plexus, and then sends off the recurrent. This winds round the remains of the arterial canal and the arch of the aorta, to the side of the trachea, but first sends branches to the anterior pulmonary plexus; it next gives off a branch to communicate with the ventricular and auricular plexuses, and distribute filaments on the pulmonary artery, and then rejoin the recurrent; it then gives a branch, as well as several filaments, to the auricular plexus, and, in passing upwards, gives filaments to the trachea, œsophagus, and thyroid gland, and to communicate with others from the second and third cervical ganglia of the sympathetic on the inferior thyroideal artery; it then passes under the exterior border of the inferior constrictor muscle of the pharynx to the inner surface of the thyroid cartilage, and terminates in the muscles of the larynx, as on the right side.

As soon as it has given off the recurrent, it winds to the posterior part of the root of the lung, and gives off the branches forming the posterior pulmonary plexus; this communicates with the thoracic and ventricular plexuses; and after giving some filaments to the cellular membrane and absorbent glands, accompanies the divisions of the trachea, to terminate principally in the air cells, after distributing some filaments on the branches of the pulmonary artery. It then passes towards the œsophagus, and sends off a branch 80 P. IV. giving filaments to the aorta, and communicating with the large branch 83 P. IV., and a branch of the right trunk 70 P. III. It then terminates in three principal branches; one of these, 81 P. IV., gives branches to the œsophagus, and is then joined by another of the divisions 82 P. IV., and passes round the œsophagus, to join a branch of the right trunk 74 P. III., to form the left or anterior trunk 2. P. III., to pass through the diaphragm to the stomach, &c.; the third, 83 P. IV., is joined by branches 84. 85. 86 P. IV., 71. 72. 73 P. III., to form the right or posterior trunk 1 P. IV. 1 P. VI., to pass through the diaphragm to the stomach, &c. The left or anterior trunk having passed through the diaphragm, 1 P. VII. sends several filaments to be distributed about the cardiac extremity of the œsophagus, and communicate with similar ones from the right or posterior trunk; it sends several branches to join the left hepatic plexus 5. 6. 7. 8. 9. 10 P. VII., and a considerable branch to the broad end of the stomach; it sends several branches, on the lesser curvature, some of which terminate at once on the stomach, and others pass along the superior gastric artery to meet the branches 21 P. VII. accompanying the pyloric artery from the right hepatic plexus, as well as filaments from the branch 14 P. VII., of the right or posterior trunk.

THE GLOSSO-PHARYNGEAL, OR ASSOCIATE OF THE EIGHTH PAIR OF NERVES.

EACH nerve arises from the restiform body by the side of the groove between this and the olivary body, and just above, and in the same line with, the origin of the trunk of the par vagum, and is the most anterior portion of the numerous fibrils belonging to this and the trunk of the par vagum. It is fibrous, firm in texture, and like the spinal nerves. It passes through the posterior lacerated foramen in the base of the skull anteriorly and exteriorly to the trunk of the par vagum, and frequently forms a ganglifform enlargement; it immediately gives off a branch, which may be properly termed the tympanine nerve.

The tympanine nerve passes in a canal in the petrous portion of the temporal bone, to that surface of the petrous portion forming one of the boundaries of the tympanum: it passes near the most projecting part of the promontory, and divides into two branches, one of which appears like the continuation of the nerve, and passes upwards a little anterior to the oval fenestra; it winds round the upper part of the termination of the Eustachian tube in the tympanum, and the canal formed for the tensor muscle of the tympanum, to communicate with the superior branch of the Vidian nerve, which in two subjects was continued to the Gasserian ganglion. The other branch passes downwards and a little forwards from the promontory, and after entering the carotic canal, communicates with the sympathetic nerve on the internal carotid artery; other filaments are distributed over the membrane lining the tympanum, and the beginning of the Eustachian tube.

The trunk communicates with the first cervical ganglion of the sympathetic nerve, and passes downwards a short distance rather behind, and to the outer side of the internal carotid artery, and then crosses over this in its course to the tongue; it receives a filament from the digastric branch of the facial nerve; it gives two branches to the pharyngeal plexus; it gives filaments to the stylo-pharyngeal muscle, and others to the posterior part of the tonsil, and the membrane on the anterior part of the epiglottis; it passes behind the stylo-pharyngeal muscle, and then forwards near the anterior border of the insertion of this, to be distributed on the posterior part of the surface of the tongue.

THE PHARYNGEAL PLEXUS.

THIS plexus is very complicated and difficult to describe, and although denominated pharyngeal, is not entirely subservient to the uses of the pharynx.

As soon as the accessory nerve has left the cranium, it gives off a branch that becomes intimately united with the junction of the trunk of the par vagum and ninth nerve, and after an intermixture of fibrils, appears to become again separated, and communicate with this plexus. This plexus receives one or more branches from the glosso-pharyngeal nerve; it communicates also with the superior and external laryngeal nerves, and the lateral cardiac plexus at the back of the carotid artery; the digastric branch of the facial nerve contributes filaments to it, and sometimes the ninth, and its descending branch; it is joined by one or more branches from the first cervical ganglion of the sympathetic nerve, and sometimes by filaments from the prolongation above this.

The branches passing from the plexus are principally distributed on the muscles of the pharynx; it gives filaments to the levator muscle of the palate, and sends branches along the superior thyroideal artery, the lingual, and all the principal branches of the external carotid, and several of these communicate with different branches of the fifth and facial nerves. The filaments, described as passing on the branches of the external carotid artery, are principally derived from the sympathetic nerve, but must nevertheless be considered as forming part of the plexus. The filaments accompanying these arteries are not throughout distinct chords, but frequently assume the form of a plexiform membrane, through which several of the communications of the different nerves are effected.

THE MYO-GLOSSAL, HYPO-GLOSSAL, OR NINTH PAIR OF NERVES.

EACH nerve usually arises in two portions from the pyramidal body, close to the groove between this and the olivary body; the origin of part of the inferior portion extends below the olivary body, but is less than the superior: sometimes only a single bundle is found, but where two, each is surrounded by a separate process of the dura

mater, and is continued through the anterior condyloid foramen to unite into a slight gangliform enlargement. It is first situated behind the trunk of the par vagum, and becomes united to this and the sympathetic nerve; it then passes across the internal and external carotid arteries, and after giving off the descending branch, sends one to the thyro-hyoideal and genio-hyoideal muscles, passes behind the stylo-hyoideal, and then in front of the hyo-glossal; it communicates with the gustatory nerve: it gives a filament to the sublingual gland; it gives filaments to the stylo-glossal muscle, the hyo-glossal, the lingual, and the genio-hyo-glossal, and passing on the inner side of the lingual artery, between two planes of this muscle, divides into filaments, which escape between the fibres of this, to terminate in the mass of delicate muscular structure forming the superficial portion of the tongue.

Part of the union between the ninth and the trunk of the par vagum is formed of very condensed cellular membrane, but there is also an intimate nervous communication between these, and between the ninth and sympathetic. The same dense substance, connecting the ninth and the trunk of the par vagum so closely, appears to extend to the sympathetic at the upper part of the first cervical ganglion, and also to the glosso-pharyngeal and the accessory. It communicates with the first cervical ganglion of the sympathetic by a branch, communicating at the same time with the sub-occipital, and the anterior branch of the first cervical nerve. The descending branch passes downwards behind the internal jugular vein, and about the inferior part of the thyroid cartilage gives filaments to the omo-hyoideal and the sterno-thyroideal mnscles; and near this place a branch proceeding from the first and second cervical nerves, and sometimes from the third, and crossing over the carotid artery and internal jugular vein, becomes united to it; after this union, it passes behind the inferior part of the upper belly of the omo-hyoideal, and then terminates in the sterno-hyoideal and sterno-thyroideal muscles; sometimes a branch passes down on the left side of the pericardium to unite with a branch of the left phrenic nerve.

THE SPINAL NERVES.

THE spinal chord has the same investing membranes as the brain, viz. the dura mater, the arachnoid, and the pia mater. The dura mater is the most exterior, and forms a very strong sheath, the dimensions of which are much greater than those of the chord; it is a continuation of the membrane lining the skull; it adheres to the edge of the great foramen and the atlas, and is attached by ligamentous bands to the posterior surface of the bodies of the vertebræ, or rather to the longitudinal ligament covering these, but is quite unconnected with the posterior part of the canal, except at the atlas. The arachnoid membrane is very thin, and almost transparent; it covers the pia mater closely, and is then reflected loosely over the chord from the posterior part, and gathers itself in a funnel-like manner round each nerve, just before this leaves the sheath formed by the dura mater, and afterwards covers closely the inner surface of this membrane. The pia mater adheres to the chord, and penetrates deep at the middle line on the anterior surface, and passes through apertures formed in the medullary part, to supply the cineritious with blood-vessels; it likewise covers the nervous fibrils.

The spinal chord is a continuation of the oblong medulla, and begins just below the origin of the ninth pair of nerves, and in the adult terminates in a point at the second lumbar vertebra. Its size varies in different places according to the quantity of nerves given off from it. It is composed of two parts having different appearances, one white, and termed medullary; the other of a red ash colour, and usually termed cineritious; it is chiefly formed of the medullary, and this is also the firmest. It is divided into two lateral portions by a middle line on its anterior and posterior surfaces; a separation is very easily made in the course of the former except at its superior part, where some strong bands are found decussating each other; but not so in the latter, as small transverse threads are found passing from one side to the

other. When a separation has been made at each middle line, the two lateral portions are found to be only united by a thin slip of the cineritious substance, extending nearly across the chord, and from this a small portion on each side is directed obliquely forwards, and a much larger one obliquely backwards; and in the latter there is a longitudinal space into which the pia mater enters by perforations along with the blood-vessels. The spinal chord is composed of cells, in which the medullary and cineritious matter is deposited. The cells are attached to the pia mater, and may be well compared with the cancellated structure of a bone originating from the more firm external shell. The method of demonstrating this has been described in the chapter on the cerebral nerves.

When the spinal chord has been sufficiently immersed in alcohol, it appears to consist of cerebral and spinal parts. On each side the middle line, both anteriorly and posteriorly, a slip may be observed composed of longitudinal fibres, extending from its termination to its connexion with the superior part of the oblong medulla; it has a direct line of separation from the part giving origin to the nerves, but is nevertheless connected with this by communicating fibres. On the anterior surface the longitudinal fibres appear to be principally the continuation of the pyramidal bodies. On the posterior surface there is the same appearance of longitudinal fibres forming a slip, which, at the inferior part of the spinal chord, becomes very narrow; this slip is formed of two portions, the more exterior is the continuation of the restiform body, the other that of the posterior pyramidal body, but the separation at length becomes indistinct. These slips communicate freely with the other parts of the chord. The spinal parts are placed on each side of the chord, and begin at the inferior extremity of the olivary bodies by a very acute angle, and by a more obtuse one near the lowest part of the restiform bodies; this disposition appears to be formed for making distinct separations between different parts of the oblong medulla and the spinal chord.

It is not improbable that the cineritious matter, and the lateral portions form the spinal chord, strictly speaking, as a distinct organ, and also give origin to its nerves; and the anterior and posterior bundles of longitudinal fibres form its cerebral portions, and exist for uniting every part of it properly with the brain. Without this structure it is difficult to conceive how each portion of the spinal chord, and its corresponding nerves, could be connected with the brain, so as to perform distinct and separate functions. On the anterior part, the longitudinal furrow separating the

two halves, is much deeper than on the posterior, thus making such a marked distinction as is necessary for the performance of the independent functions of the several muscles of the two sides of the body. On the posterior part the longitudinal furrow is so undefined, as not to be traced into the chord without dividing some of its fibres.

A bundle of filaments arises from the anterior and posterior surfaces of each half of the chord for the formation of a single nerve. The anterior bundles are for the most part smaller, and composed of finer threads than the posterior. On a superficial view, each bundle appears to consist of minute threads arising by several others still more minute, and these are continued into the cellular structure of the chord. On each surface the threads belonging to the different nerves sometimes communicate; but this connexion exists in only a few of the nerves, and does not observe any regularity, as by far the greatest number is entirely separate; and this same inconstant connexion of the fibrils of two nerves has been observed in some animals. Immediately on leaving the spinal canal, each posterior bundle terminates in a ganglion, which is composed chiefly of the fibrils, and a red substance of the same nature as the neurilema; the fibrils spread out into finer ones in this substance, and after having communicated there with each other, collect again into a nerve, to which the anterior bundle becomes immediately united. The nerve thus formed is much larger than both the bundles added together before the formation of the ganglion, and much stronger from its being enclosed in a thicker covering, called the neurilema.

The anterior and posterior bundles are separated from each other by the denticulated ligament; this is united to the pia mater at the side of the chord in a fine but strong membrane; many parts of its outer edge are unattached, but it is nevertheless firmly fixed to the dura mater, first near the exit of the par vagum, and then by numerous lateral processes through the whole length of the spinal sheath. The dura mater forms a distinct sheath for each anterior and posterior bundle; these adhere to the sheaths, which become attached to each other just at their exit from the spinal canal.

For the purpose of showing the proper extent of the neurilema, it is best to immerse a portion of nerve in a solution of potassa, which causes a thickening of the neurilema, and renders it at the same time somewhat transparent. It has been supposed that the medullary matter is contained in canals formed by the neurilema, as injection would be in the blood-vessels; but this is erroneous, for if the medullary portion of nerve be drawn out of the neurilema, after having been subjected to the influence of a solution

of potassa, it will be found to be composed of still finer threads, connected together by a proportionate membrane; the same arrangement may be also observed in a nerve after a sufficient immersion in a diluted acid.

The size of the nerves varies in different situations. The bundles of most of the cervical nerves are large; those of the first pass horizontally from the spinal chord to the ganglion, the others pass with a slight obliquity. The bundles of all the dorsal nerves, except the first, are much less than those of the cervical, and take a still more oblique course from the chord; those of the lumbar and three upper sacral are larger than the dorsal, and pass with a still greater obliquity; those of the three lower sacral are small, and pass in an almost perpendicular direction. Each nerve, except the sub-occipital, the fifth lumbar and the sacral, passes out at an aperture formed by a notch in the upper and under edge of the vertebræ, and almost immediately divides into an anterior and posterior trunk. It is worthy of remark, that whether each posterior bundle be long or short, it does not form a ganglion until it is about to leave the spinal canal. Although the ganglion may have specific functions to perform in effecting some change in the disposition of the fibrils, yet it may also answer a convenient purpose in adapting the delicate origins of the nerves to the rest of the body, as before their connexion with the ganglion, the nerves do not appear to be of sufficient strength for the actions or motions of the parts designed for their reception. It would have encumbered the spinal chord for this enlargement to have taken place too near to it, and therefore this change could not have been effected in a more convenient form or situation than is presented by each ganglion.

THE ASCENDING SPINAL NERVE, OR ACCESSORY TO THE PAR VAGUM.

The origin of this nerve varies very much in different subjects, being sometimes observed to reach only from the connexion of the first cervical nerve with the spinal chord, whilst in others it is continued from the sixth or seventh. In the preparation from which the plates were taken, the right nerve arises by a filament from the posterior bundle of the fourth, third, second, and first cervical nerves, and the sub-occipital; in ascending it receives many filaments from different parts of the posterior surface of the spinal chord, between the origin of the posterior fibrils and the

denticulated ligament, and these are the most numerous near the origin of the first cervical nerve: it receives many filaments from the oblong medulla, and communicates with the bundle forming the trunk of the par vagum. On the left side it arises from the spinal chord between the posterior bundle of the fourth and fifth cervical nerves; it receives many filaments from the spinal chord in its course upwards, and communicates with the posterior bundles of the cervical nerves and the sub-occipital in ascending, and with the bundle forming the trunk of the par vagum.

Each nerve passes upwards between the posterior bundles and the denticulated ligament, and has its egress from the cranium with the trunk of the par vagum at the posterior lacerated foramen. When it has left the cranium, it becomes united with the trunk of the par vagum and the ninth, and gives a branch to the pharyngeal plexus; it then enters the superior third of the sterno-cleido-mastoid muscle, and gives to this a considerable branch, which communicates with one from the union of the first and second cervical nerves; when it has passed through the muscle, it communicates with the second cervical nerve; it then passes downwards and terminates in the trapezius muscle, after having communicated with the third cervical nerve.

THE SUB-OCCIPITAL NERVE.

THE posterior bundle of this nerve frequently arises from the accessory, and is smaller than the anterior; it passes out of the spinal canal with the anterior between the occipital bone and the atlas, just where the vertebral artery enters the great foramen, and the ganglion is placed close behind this artery. The nerve divides into an anterior and posterior trunk.

The anterior trunk gives a filament to the vertebral artery, and then passes forward in contact with the outer part of this to the front of the neck, and communicates with the ninth, the trunk of the par vagum, and the sympathetic nerve: it sends a branch to join the first cervical nerve, and gives a filament to the anterior larger and smaller, and lateral straight muscles of the head.

The posterior trunk, in passing backwards, gives a branch to the complex, the posterior straight and oblique muscles, and sends one down to communicate with the posterior trunk of the first cervical nerve. Sometimes the inferior oblique muscle is supplied by the posterior trunk of the first cervical nerve.

THE FIRST CERVICAL NERVE.

THE anterior trunk communicates with that of the sub-occipital and the second cervical nerves, and the sympathetic; it gives a branch to the larger anterior straight muscle; it sends a branch to join the descending of the ninth, and one from its union with the second, to terminate in the sterno-cleido-mastoid muscle, after communicating with the accessory, before this has entirely escaped from the posterior border of the muscle: it sends a branch to join the accessory after this has left the sterno-cleido-mastoid muscle.

The posterior trunk is of considerable size; it sends a branch to join one from the posterior trunk of the second; it gives a branch to the inferior oblique muscle of the head; several to the complex; one to the splenius of the head and the trachelo-mastoid: it passes backward at the inner side of the complex, pierces this, and communicates with the branch of the anterior trunk of the second distributed to the scalp of the occiput, and terminates in the occipito-frontal muscle and the scalp.

From the posterior trunks of the spinal nerves, or from the point at which these are about to separate from the anterior trunks, filaments may be traced to the ligaments and periosteum at the posterior part of the spine, whilst the bodies of the vertebræ, and the ligaments connected with these, and the heads of the ribs, receive filaments from the sympathetic.

In one subject, on the right side, a branch from each anterior trunk of the first second, and third cervical nerves, joined a nerve formed from two branches of the trunk of the par vagum, which was in the place of the descending branch of the ninth. On the left side the usual descending branch of the ninth was also given off by the trunk of the par vagum, and was joined by a branch from the second cervical nerve, and a larger one from the first. In another subject, the usual descending branch of the ninth was also given off by one trunk of the par vagum.

THE SECOND CERVICAL NERVE.

The anterior trunk communicates with the sympathetic, and the third cervical nerve. It gives a filament to the long muscle of the neck. It sends a branch to the levator muscle of the scapula and the splenius of the neck; it gives off a large branch, which distributes many filaments to the skin at the posterior and lobular part of the ear: it communicates in the parotid gland with the facial nerve, and gives filaments to the skin of the face. Another branch passes towards the angle of the jaw, communicates with the facial nerve, and terminates in the skin of this part, and the cutaneous muscle and the skin of the side of the neck. It next gives off a branch to be joined by one from the accessory, and distributed to the skin near the mastoid process; a branch joins one from the first cervical nerve to communicate with the descending branch of the ninth, and give a filament to the phrenic nerve.

The posterior trunk is smaller than that of the first; it communicates with a branch of this; it passes backwards between the semi-spinal and complex muscles, gives a branch to the complex, splenius and transverse muscles, and pierces the complex, splenius and trapezius, to terminate in the skin at the posterior part of the neck.

THE THIRD CERVICAL NERVE.

The anterior trunk communicates with the sympathetic and the fourth cervical nerve; it gives a filament to the posterior scalenus muscle, and one that divides to terminate in the anterior scalenus and the long muscle of the neck; it forms the principal part of the phrenic nerve: it sometimes communicates with the branch of the first and second joining the descending branch of the ninth; it gives a considerable branch to the trapezius, which communicates with the accessory near the termination of this nerve in the same muscle: it sends off a large branch, dividing into several others, which distribute filaments on the skin contiguous to the acromion and clavicle, and send one down the arm to some distance in the course of the cephalic vein, and another to com-

municate with the intercostal branch of the first dorsal nerve passing between the cartilages of the first and second ribs to the skin on the front of the chest.

The posterior trunk is smaller than that of the second; it gives filaments to the semi-spinal and other small muscles, and its principal continuation then passes between the semi-spinal and the complex, gives filaments to the splenius, pierces this also and the trapezius, and terminates on the skin.

THE FOURTH CERVICAL NERVE.

THE anterior trunk communicates with the sympathetic; it sends off a small branch, which communicates with one from the fifth cervical and the sympathetic, and gives a filament to the anterior scalenus, and terminates in the long muscle of the neck. It gives a branch to the phrenic, also a larger one to pass between the middle and posterior scalenus muscles, give a filament to the middle, and be distributed to the levator of the scapula, and the greater serrated muscle; it then passes from between the anterior and middle scalenus muscles to join the fifth in the axillary plexus.

The posterior trunk is small; it gives filaments to the semi-spinal and other small muscles, and then passes between the semi-spinal and complex muscles, and pierces the splenius and trapezius to terminate on the skin at the back of the neck.

THE FIFTH CERVICAL NERVE.

THE anterior trunk communicates with the sympathetic: it sends off a small branch which communicates with one from the fourth cervical nerve and the sympathetic, and gives a filament to the anterior scalenus muscle, and terminates in the long muscle of the neck. It sends off a considerable branch to pass between the fibres of the middle scalenus muscle, and join a branch from the sixth cervical nerve, to terminate chiefly in the great serrated muscle; it then passes from between the anterior and middle scalenus muscles, to join the fourth and sixth in the axillary plexus.

The posterior trunk is small; it gives filaments to the semi-spinal and other small muscles, and passes between the semi-spinal and complex muscles, to terminate on the latter.

THE SIXTH CERVICAL NERVE.

THE anterior trunk communicates with the sympathetic, and passes between the anterior and middle scalenus muscles, and joins the union of the fourth and fifth in the axillary plexus.

The posterior trunk is small; it gives filaments to the semi-spinal and other small muscles, and passes between the semi-spinal and complex to terminate on the latter.

THE SEVENTH CERVICAL NERVE.

THE anterior trunk communicates with the sympathetic; it passes between the subclavian artery and the middle scalenus muscle, to join the principal part of the first dorsal nerve, and communicate with that part of the axillary plexus giving origin to the spiral nerve.

The posterior trunk gives filaments to the semi-spinal and other small muscles, and then passes between the semi-spinal and complex muscles, and terminates on the latter.

THE PHRENIC NERVE.

IT generally has its principal origin from the third cervical nerve, and receives a branch from the second and fourth; it communicates either with the middle or inferior cervical ganglion of the sympathetic, and in passing down sometimes receives a branch

from the axillary plexus. It enters the thorax between the subclavian artery and vein, and gives filaments to the pericardium, and passes between this and the pleura to terminate in the diaphragm.

On the right side a small ganglion receives one or two branches from the phrenic nerve and the right semilunar ganglion, and then communicates with the renal capsule, and gives filaments to the outside of the inferior cava vein, and passes behind the hepatic vessels to terminate in the left hepatic plexus.

On the left side, soon after it has entered the thorax, a branch is sometimes received from the union of the descending branch of the ninth with branches from the first and second cervical nerves. A communication between this nerve and the semilunar ganglion may be found; but it is very minute, and does not take place by means of a ganglion as on the right side.

THE AXILLARY PLEXUS.

It is formed by the principal portions of the four inferior cervical and the first dorsal nerves. It gives several branches to the skin of the axilla, and others, termed thoracic and sub-scapular, to several muscles. It gives off the following principal nerves, viz. the superior scapular, the circumflex, the small internal cutaneous, the internal cutaneous, the musculo-cutaneous, the median, the ulnar, and the spiral.

THE SUPERIOR SCAPULAR NERVE.

It arises principally from the fourth cervical nerve, but is also connected with the circumflex, the spiral, and part of the median. It passes outwards and backwards through the semilunar notch in the superior costa of the scapula, and gives filaments to the periosteum near the neck of the scapula, and a large branch to the superior spinous muscle; it is then continued under the acromion, and after giving a filament to the capsular ligament of the shoulder joint, is distributed to the inferior spinous muscle; it frequently also sends a branch to the small teres.

THE THORACIC NERVES.

These arise from the union of the fourth and fifth cervical nerves, the sixth, and the union of the seventh and the first dorsal, then communicate with a branch of the second dorsal nerve passing between the second and third ribs, and terminate in the great and small pectoral muscles. Sometimes a branch is given from the union of the fifth and sixth cervical nerves to the coraco-brachial muscle.

THE SUB-SCAPULAR NERVES.

These arise from the union of the fourth and fifth cervical nerves, are connected with the spiral, and given to the sub-scapular muscle; a large branch, from the union of a branch of the sixth cervical nerve with the spiral, passes between the great serrated and sub-scapular muscles, and is then distributed on the broadest muscle of the back and the skin. A large branch and a smaller one, connected with the beginning of the circumflex nerve, are given to the large and small teres muscles.

THE CIRCUMFLEX NERVE.

It is formed chiefly from the fourth and fifth cervical nerves, and is very much connected with the origins of the superior scapular, the spiral and part of the median; it passes obliquely downwards, and outwards round the posterior part and just below the head of the arm bone, between the anterior border of the sub-scapular muscle, and the insertion of the large teres and the broadest muscle of the back; it gives branches to the posterior edge of the deltoid muscle: it gives a branch to the small teres muscle, and sends a filament through a portion of this to the inferior spinous muscle; it gives

a considerable branch to terminate on the skin at the back of the arm and shoulder; the continuation of the nerve then divides into branches, one of which gives a filament to the capsular ligament of the shoulder joint, and then, with the rest, terminates in the deltoid muscle.

THE SMALL INTERNAL CUTANEOUS NERVE.

It arises from the first dorsal nerve, near the union of this with the seventh cervical; it gives off a branch to be joined by one from the external division of the second and third dorsal nerves passing between the ribs to be distributed on the cellular membrane and skin of the axilla and the inner side of the arm. The rest of the nerve passes on the inner and posterior part of the arm, gives filaments to the skin, and terminates on the skin and fascia behind the inner condyle of the arm bone.

THE INTERNAL CUTANEOUS NERVE.

It arises from the union of the seventh cervical and first dorsal nerves, and passes down the inner side of the arm, near to, or upon the basilic vein. In some subjects it receives a branch from the ulnar about the middle of the arm, and a filament from a of the thoracic nerves; in descending it gives several filaments to the skin, and one larger one to the fascia and skin about the internal condyle of the arm bone. About the middle of the arm it divides into two principal branches, an external and internal one, and these sometimes pass over and sometimes underneath the basilic vein. The external one divides about the bend of the elbow into two principal branches; these descend as far as the wrist, and give filaments to the skin in their course, and sometimes communicate with a long branch of the ulnar sent upon the ulnar artery; the internal branch divides into others, passing obliquely to the inner part of the arm as far as the wrist, and communicating with a filament from the dorsal branch of the ulnar.

THE EXTERNAL CUTANEOUS, OR MUSCULO-CUTANEOUS NERVE.

It arises from a portion of the union of the fourth and fifth cervical nerves, also from the sixth, and is thus connected with a part of the median; it gives a branch to the coraco-brachial muscle, and having pierced this, sends a large branch to the biceps; it communicates with the median nerve, and sometimes the internal cutaneous; it gives a large branch to the internal brachial muscle, and from this branch a filament is sent to accompany the brachial artery. At the elbow it passes behind the median cephalic vein, and sends several branches to the skin, one of which communicates with a filament of the cutaneous branch of the spiral at the upper part of the fore-arm; two principal branches are continued as far as the wrist, and near this part communicate with a branch of the radial, and the cutaneous branch of the median sent to the skin of the palm.

THE MEDIAN NERVE.

It arises in two portions from a part of the union of the fourth and fifth cervical nerves, also from the sixth, and is thus connected with the external cutaneous; the more external one is connected with the union of the seventh cervical and the first dorsal. The two portions near their termination in the trunk embrace anteriorly the brachial artery; it then descends upon this vessel, and about the middle of the arm communicates with the external cutaneous nerve; it passes between the insertion of the internal brachial muscle and the round pronator of the radius, then between some fibres of the latter, and continues its course between the sublime perforated, and the deep perforating flexor muscles of the fingers. Near the wrist it becomes more superficial, and is situated between the outer tendon of the sublime perforated flexor of the fingers, and that of the radial flexor of the wrist; it then passes beneath the annular ligament of the wrist into the hand, to divide principally into the digital branches, underneath

the palmar arterial arch. Just above the bend of the elbow it gives a branch to the origin of the round pronator and radial flexor of the wrist, and in passing between the insertion of the internal brachial muscle and the round pronator, a large branch is given off, which becomes the interosseous; this accompanies the interosseous artery between the long flexor of the thumb, and the deep perforating flexor of the fingers, and sends branches to the round pronator, the radial flexor of the wrist, the sublime perforated and deep perforating flexors of the fingers, the long flexor of the thumb, and after giving its principal part to the square pronator, sends filaments to the periosteum and ligaments near the junction of the head of the radius with the ulna ; one of the branches given to the deep flexor of the fingers communicates with the ulnar nerve.

In its course it gives some filaments to the sublime perforated flexor of the fingers, and from the outer side of the tendons of this muscle, near the wrist, sends a branch to the skin of the palm, which communicates with a branch of the radial and the external cutaneous. It then passes underneath the annular ligament of the wrist, and at the inferior part of this communicates with the ulnar, and beneath the arterial palmar arch divides into five branches. The first divides and gives branches to the abductor muscle, and the opponent or flexor of the metacarpal bone of the thumb, and a filament to the outer portion of the short flexor. The second gives two filaments to communicate with the branch sent from the deep palmar nerve of the ulnar, and terminate on the short flexor of the thumb; it is then distributed on the skin on the outer side of the thumb: the third gives a branch to the first lumbrical muscle, and passes, after dividing, to the inner side of the thumb and the outer side of the fore-finger; the fourth gives a branch to the secoud lumbrical muscle, and to the inner side of the fore-finger and the outer side of the second; the fifth generally gives a filament to the third lumbrical muscle, and then divides to pass to the inner side of the second and the outer side of the ring finger.

Besides the branches sent to encircle some of the trunks of the digital arteries, each digital nerve in its course gives filaments to the skin of the finger, and the external surface of the sheaths of the tendons, but its principal part forms numerous ramifications near the tip; one of these passes deep on each side to terminate at the root of the nail, the rest form a brush of filaments, which are accompanied by minute arteries, and have their points directed to the surface of the skin at the tip. Branches also enter the sheaths of the tendons, and give filaments to these, and then, accompanied by small arteries, pass along the slender bands attached to the backs of the tendons to terminate

in these. Each digital nerve sends a branch along the back of the thumb and fingers to communicate with a branch of the radial nerve, and distribute filaments on the skin, the ligaments and sheaths of the tendons.

THE ULNAR NERVE.

It arises from the seventh cervical and first dorsal nerves; it passes down at the inner side of the arm, and a little below the middle is surrounded by a strong fascia, and sometimes by fibres of the triceps: it passes behind the inner condyle of the arm bone, in a groove between this and the olecranon, and gives one or two fine filaments to the capsular ligament on the inner side of the elbow; it passes between the origins of the deep flexor of the fingers and the ulnar flexor of the wrist, and is continued upon the former, and by the side of the anterior border of the latter on the inner or ulnar side of the ulnar artery to the hand; it passes over the annular ligament confined by a process extending from this to the pea-shaped bone.

At the inferior part of the arm it sometimes gives filaments to the triceps muscle and the skin, and in the fore-arm near the elbow, it gives others to the ulnar flexor of the wrist and the deep flexor of the fingers, and a small one to the capsular ligament. Frequently about the middle of the fore-arm a branch is sent on the ulnar artery, giving filaments to this and the skin, and communicating with a branch of the internal cutaneous nerve.

Close to the pea-shaped bone it gives a superficial branch to the skin of the palm and the short palmar muscle, and then divides into three branches. The first communicates with a branch of the median nerves, and gives off filaments to encircle the digital artery supplying the ring and little fingers; it then gives filaments to the skin, and divides and sends one branch along the inner side of the ring, and the other on the outer side of the little finger, and each of these sends a branch to join one from the dorsal branch of the ulnar, to be distributed on the skin, &c. at the back of the finger, and then pass along the side of each finger, giving filaments to the skin and the exterior surface of the sheaths of the tendons; each digital nerve also sends off other minute branches to enter the sheaths of the tendons, give filaments to these, and accompanied by small arteries become connected with the tendons by the slender bands attached to their

posterior part; then each digital nerve divides into several branches near the tip; one of these terminates on the side of the root of the nail, and the rest form a brush of filaments which are accompanied by minute arteries, and have their points directed to the surface of the skin; a communication between each digital nerve may sometimes be traced near the tip.

The deep palmar branch dips down into the palm beneath the tendons of the flexor muscles of the fingers, and forms an arch, from which branches pass to the abductor, the small flexor and adductor of the little finger, the two inner lumbrical and the interosseous muscles; branches also pass from it to the abductor of the fore-finger, the adductor and short flexor of the thumb; that supplying the inner division of the latter muscle passes underneath the tendon of the long flexor of the thumb to the outer division of the short flexor, and communicates with two filaments sent from the branch of the median nerve, which terminates on the skin at the outer side of the thumb.

Very near the wrist the dorsal branch passes under the tendon of the ulnar flexor of the wrist, and sends a branch to the anterior and inner part of the capsular ligament; it gives branches to the skin at the back of the hand, and communicates with filaments of the internal cutaneous nerve, the cutaneous branch of the spiral and the radial; it then divides into two principal branches; one passes to the inner side of the little finger and gives filaments to the skin, the sheaths of the tendons and ligaments; the second again divides for supplying the outer side of the little and the inner side of the ring fingers, and the outer side of this, and the inner side of the second, to communicate with branches of the digital nerves, and terminate on the skin, the ligaments, and tendinous sheaths.

THE SPIRAL NERVE.

It is formed by the union of the fourth and fifth, by part of the sixth, and a branch from the union of the seventh cervical and first dorsal nerves; it passes from the posterior part of the axillary plexus to get between the short and outer heads of the triceps, and then winds round to the outer side between the arm bone and the outer head of the triceps, and for a short distance is situated between this and the internal

brachial muscle, and then between this and the long supinator of the radius, and in its course divides into many branches.

A large branch passes off just below the tendon of the broadest muscle of the back to the long head of the triceps, and another branch is also given to the short and outer heads of this muscle. A small branch is given to the skin and fascia at the back of the arm. The posterior cutaneous nerve, frequently arising by two branches, comes out between the internal brachial muscle and the outer head of the triceps, near the origin of the long supinator of the radius; it then descends at the back of the arm as far as the wrist, and communicates in its course with the external cutaneous, and near the wrist with the dorsal branch of the ulnar, the external cutaneous and the radial. Between the internal brachial muscle and the long supinator of the radius, two or three branches arise to be distributed to the latter and the radial extensors of the wrist, and give filaments to the capsular ligament on the outer side of the elbow.

About the bend of the elbow the radial is sent off, and continued down at the inner side of the long supinator muscle to within a third of the length of the radius from the wrist, when it passes under the tendon of this muscle, and divides into two principal branches; one sends filaments to the annular ligament, and communicates with a branch of the external cutaneous and the median, and is then distributed on the skin and ligaments, and tendinous sheaths on the outer side of the thumb; the other sends filaments to the annular ligament, and communicates with the posterior cutaneous of the spiral, the external cutaneous, and the dorsal branch of the ulnar; it then divides into three or four branches; one passes to the inner side of the thumb, but first sends a branch behind the artery of the thumb to the anterior and outer part of the capsular ligament of the wrist; the second passes to the outer side of the fore-finger, and the third to the inner side of the same finger, and a fourth to the outer side of the second finger; these communicate with the branches sent posteriorly from the anterior digital nerves, and are distributed on the skin and ligaments and sheaths of the tendons at the back of the fingers.

The continuation of the trunk passes beneath the long supinator of the radius, and gives branches to this muscle and the radial extensors of the wrist; it perforates the short supinator in passing to the back of the fore-arm; it gives branches to the extensors of the thumb, to that of the fingers, to the ulnar extensor of the wrist and the indicator; it then descends under the extensor of the fingers on that of the metacarpal bone and first phalanx of the thumb, and then under part of that of the second phalanx

and the indicator; underneath the annular ligament it forms a gangliform enlargement upon the capsular ligament of the wrist, which gives off small branches to be distributed on the capsular ligaments and the tendinous sheaths at the back of the wrist.

THE FIRST DORSAL NERVE.

THE anterior trunk is of much larger size than that of any of the other dorsal nerves. It communicates with the sympathetic, and its greatest portion then passes over the superior edge of the first rib behind the subclavian artery, and joins the seventh cervical nerve in the axillary plexus; a larger portion than usual divides into two branches, 50. 51 P. XVII., an external and internal. The internal branch passes forward at the inferior margin of the first rib, and gives filaments to the intercostal muscles; it then pierces the muscular fibres between the cartilages of the first and second ribs, and, after giving a filament to the great pectoral muscle, and communicating with filaments from the third cervical nerve passing over the clavicle, terminates in the skin over the sternum. The external branch passes between the first and second ribs, and sends a small branch forward to the intercostal muscles, communicates with a branch of the external of the second, and gives filaments to the skin of the axilla, and others to the skin at the posterior and inner side of the arm as far as the elbow, so that in this subject it forms the small internal cutaneous nerve.

The posterior trunk passes backwards, and after giving filaments to the small muscles and the sacro-lumbar, pierces these and the trapezius, and terminates in the skin.

THE SECOND DORSAL NERVE.

THE anterior trunk communicates with the sympathetic; it gives many filaments to the intercostal muscles, and near the angle of the rib, divides into two branches; the internal and least goes forward and gives filaments to the intercostal muscles; it then

passes between the cartilages of the second and third ribs, and terminates in the mamma and skin over this part. The external branch pierces the muscles between the second and third ribs, and immediately gives off a small branch to pass forward to the mamma and skin; it communicates with the external branch of the third, and sometimes the first and the small internal cutaneous, and terminates on the skin of the axilla and breast, and the inner side of the arm.

The posterior trunk, after giving filaments to the small muscles, the sacro-lumbar, and the longest muscle of the back, pierces these and the trapezius, and terminates on the skin of the back.

THE THIRD DORSAL NERVE.

THE anterior trunk communicates with the sympathetic: it, as well as many of the other dorsal nerves, accompanies an intercostal artery; it gives filaments to the intercostal muscles, and about the middle of the rib divides into an internal and external branch. The internal goes forward and gives filaments to the intercostal muscles and the triangular muscle of the sternum; it passes between the cartilages of the third and fourth ribs, gives a filament to the great pectoral muscle, and terminates in the skin near the mamma. The external branch pierces the muscles between the third and fourth ribs, communicates with the external branch of the second and the small internal cutaneous nerve, and passes backwards to terminate on the skin about the axilla, and the inferior costa of the scapula.

The posterior trunk, after giving filaments to the small muscles, the sacro-lumbar, and the longest muscle of the back, pierces these and the trapezius to terminate on the skin.

THE FOURTH DORSAL NERVE.

THE anterior trunk communicates with the sympathetic; it passes forward and gives filaments to the intercostal muscles, and then divides into branches. The internal passes forward at the inferior margin of the fourth rib, and gives filaments to the intercostal

muscles, and the triangular muscle of the sternum; it then passes between the cartilages of the fourth and fifth ribs, and terminates in the mamma and skin over this part. The external branch pierces the muscles between the fourth and fifth ribs, and divides into an anterior and posterior branch: the anterior goes forwards and terminates in the mamma; the posterior goes backward, and terminates in the skin at the inner edge of the scapula.

The posterior trunk, after giving filaments to the small muscles and the sacro-lumbar and the longest dorsal, pierces these and the trapezius, and terminates on the skin.

THE FIFTH DORSAL NERVE.

THE anterior trunk communicates with the sympathetic; it gives filaments to the intercostal muscles, and at the angle of the rib divides into two branches. The internal, which is the smallest, continues to give filaments to the intercostal muscles, and the triangular muscle of the sternum; it then passes between the cartilages of the fifth and sixth ribs, and terminates in the skin at the anterior part of the chest. The external branch pierces the muscles between the fifth and sixth ribs, and divides into an anterior and posterior branch; the anterior passes forwards and gives a filament to the great serrated muscle near its plication with the external oblique, and terminates in the skin at the lateral and anterior part of the chest; the posterior branch goes backwards, and is distributed to the skin, at the lateral and posterior part of the chest.

The posterior trunk, after giving filaments to the small muscles and the sacro-lumbar and the longest dorsal, pierces these and the trapezius, and terminates in the skin of the back.

THE SIXTH DORSAL NERVE.

THE anterior trunk communicates with the sympathetic, distributes filaments to the intercostal muscles, and at the angle of the rib divides into two branches. The internal, which is the smallest, passes forward under the inferior edge of the sixth rib, gives

filaments to the intercostal muscles, the diaphragm, the ligamentous covering of the cartilage of the sixth rib, and the triangular muscle of the sternum, passes between the cartilages of the sixth and seventh ribs, and is distributed to the skin at the anterior part of the chest. The external branch pierces the muscles between the sixth and seventh ribs, and divides into an anterior and posterior branch; the anterior gives a filament to the external oblique near its plications with the great serrated muscle, and is then distributed on the skin on the anterior and lateral part of the chest, whilst the posterior terminates in the skin on the lateral and posterior part.

The posterior trunk, after giving branches to the small muscles, the sacro-lumbar and the longest dorsal, pierces these and the trapezius, and terminates in the skin of the back.

THE SEVENTH DORSAL NERVE.

THE anterior trunk communicates with the sympathetic and gives filaments to the intercostal muscles*, and near the angle of the rib divides into two branches. The internal passes at the inferior edge of the seventh rib, and gives filaments to the intercostal muscles; it divides into two branches, which pierce, or rather insinuate themselves under the origin of part of the diaphragm; these reunite and wind over the cartilage of the eighth rib, to give some filaments to the straight muscle of the abdomen, and send others through this to the skin. The external branch divides into an anterior and posterior branch; the anterior goes forward and gives a filament to the external oblique near its plication with the great serrated muscle, and terminates in the skin at the lateral and anterior part of the chest; the posterior branch goes backward, and is distributed to the skin of the side and back.

The posterior trunk, after giving filaments to the small muscles, the sacro-lumbar and the longest dorsal, pierces these and the trapezius, and terminates in the skin of the back.

* In one subject it passed about three inches, and sent off a large branch obliquely over the eighth rib to communicate with the eighth dorsal nerve, and then proceeded in the ordinary course.

THE EIGHTH DORSAL NERVE.

THE anterior trunk communicates with the sympathetic nerve, and gives filaments to the intercostal muscles; near the angle of the rib it divides into two branches. The internal branch in its course gives filaments to the intercostal muscles, and then pierces the diaphragm, to which it gives filaments; it follows the inferior edge of the eighth rib and gives filaments to the transverse muscle, and divides into two branches; the superior gives filaments to the straight muscle and then pierces this to terminate on the skin; the inferior gives filaments to the transverse muscle and communicates with the internal branch of the ninth dorsal nerve, it then gives filaments to the straight muscle, and terminates in the skin. The external branch passes through the muscles between the eighth and ninth ribs; the anterior gives filaments to the external oblique and terminates in the skin at the lateral and interior parts of the chest: the posterior goes backwards and is distributed on the skin of the side.

The posterior trunk divides after giving branches to the small muscles, the sacro-lumbar, and the longest dorsal, and pierces the trapezius to terminate in the skin of the back.

THE NINTH DORSAL NERVE.

THE anterior trunk communicates with the sympathetic nerve, and gives filaments to the intercostal muscles, and at the angle of the rib divides into branches. The internal passes forward, giving filaments to the intercostal muscles; it pierces the diaphragm, to which it gives a filament; it then divides into two branches, which pass forward between the transverse and internal oblique muscles, and to both of these give filaments; the superior branch communicates with the internal one of the eighth, the inferior with that of the tenth, both then enter the sheath of the straight muscle, and after giving numerous filaments to this muscle, pierce it and terminate in the skin. The external branch pierces the muscles between the ninth and tenth ribs; it sends a considerable branch

forward to give filaments to the external oblique, and terminate on the skin of the anterior and lateral part of the abdomen, and another to pass posteriorly to the skin of the side.

The posterior trunk, after giving filaments to the small muscles, the sacro-lumbar, and the longest dorsal, pierces these and the tendon of the broadest muscle of the back, and terminates in the skin of the back.

THE TENTH DORSAL NERVE.

THE anterior trunk communicates with the sympathetic nerve; it passes at the inferior margin of the tenth rib, and in its course gives several filaments to the intercostal muscles, and divides into two branches. The internal branch pierces the diaphragm and to this gives some very minute filaments; it then passes between the transverse and internal oblique muscles, and to both of these gives filaments; it communicates with the internal branch of the ninth and eleventh, and then enters the sheath of the straight muscle, gives filaments to this muscle, which it pierces to terminate in the skin. The external branch passes between the tenth and eleventh ribs; it gives a filament to the external oblique muscle, and passes downwards and forwards to terminate in the skin at the anterior part of the abdomen.

The posterior trunk, after giving filaments to the small muscles, the sacro-lumbar, and the longest dorsal, pierces these and the tendon of the broadest muscle of the back, and terminates in the skin of the loins.

THE ELEVENTH DORSAL NERVE.

THE anterior trunk communicates with the sympathetic nerve; it then passes obliquely downwards for a short distance and gives filaments to the intercostal muscles; it then pierces the diaphragm, and to this also gives filaments; it continues its course along the inferior edge of the eleventh rib, and divides into two branches. The internal

passes between the transverse and internal oblique muscles, and divides into three branches, all of which give filaments to these muscles; the superior communicates with the internal of the tenth, and terminates in the straight muscle; the middle one also terminates in this muscle; the inferior communicates with the internal branch of the twelfth, and after giving many filaments to the straight muscle, pierces this and terminates in the skin. The external branch pierces the transverse and the internal and external oblique muscles, gives filaments to the two last, and passes downwards and forwards to terminate in the skin.

The posterior trunk gives branches to the small muscles, the sacro-lumbar, and the longest dorsal, and pierces these and the tendon of the broadest muscle of the back to terminate in the skin of the loins.

THE TWELFTH DORSAL NERVE.

THE anterior trunk communicates with the sympathetic nerve, and soon after pierces the diaphragm, and to this gives filaments; it immediately sends a long branch, 18 P. XVIII. downwards and forwards, which communicates with the external branch before this pierces the transverse and oblique muscles, and then divides into two branches to enter the sheath of the straight muscle, one to terminate in this muscle, the other to pass through to the skin; it then divides into two principal branches. The internal branch gives filaments to the transverse muscle, it is then continued between the transverse and internal oblique muscles, and to both of these gives filaments; it communicates with the inferior branch of the internal of the eleventh, then passes obliquely downwards and forwards and pierces the sheath of the straight muscle, gives filaments to this muscle, and terminates in the skin. The external branch is large; it pierces the transverse and the two oblique muscles, and is then distributed to the skin over the anterior portion of the ilium, one branch passing as far as the greater trochanter.

The posterior trunk gives filaments to the small muscles, the sacro-lumbar, and longest dorsal, pierces these and the tendon of the broadest muscle of the back to terminate in the skin of the loins, after communicating with a branch of the posterior

trunk of the first lumbar nerve: it sends off a considerable branch near its origin, giving filaments to the muscles, and then rejoining the trunk after it has pierced the tendon of the broadest muscle of the back.

THE FIRST LUMBAR NERVE.

THE lumbar nerves, but more particularly the four upper ones, on leaving the spinal canal, are placed amongst the fibres forming the origin of the great psoas muscle, and the manner in which these divide to supply the same parts in different subjects is very various.

The anterior trunk communicates with the sympathetic nerve, and joins a branch of the second lumbar passing to the anterior crural. It gives a filament to the square muscle of the loins; it gives off a considerable branch, 21 P. XVIII. to pierce the posterior part of the great psoas muscle, and descend upon this to distribute several small branches on the transverse muscle; it then pierces this and the internal oblique near the anterior and superior spinous process of the ilium; it communicates with one of the branches of the external spermatic nerve, and then passes forwards, and divides into several branches to pass through the tendon of the external oblique to the skin near the pubes. Another branch 22 P. XVIII. forms the external spermatic, and is joined by a branch of the second; it pierces the anterior part of the great psoas muscle, and gives off five branches. The first is a long branch, 23 P. XVIII.; it passes downwards and gives a filament to the transverse fascia, and then divides into two branches, which pierce the transverse and internal oblique; one terminates in, and the other gives filaments to these muscles; the latter, after communicating with the nerve 1 P. XXIV. pierces the tendon of the external oblique, and terminates on the skin about the pubes. The second 24 P. XVIII. passes through the origin of the transverse muscle from Poupart's ligament, gives a filament to the transverse fascia, and divides into two branches to pass outwardly, and terminate in the skin near the anterior and superior spinous process of the ilium. The third 25 P. XVIII. is small, and terminates on the transverse fascia, &c. The fourth 26 P. XVIII. is large, and divides into three others to pass through fibres of Poupart's ligament to terminate on the

skin; the outer near the anterior and superior spinous process of the ilium; the second at the upper part of the thigh, and the third near the pubes. The fifth 27 P. XVIII. is a large branch, which may itself be properly termed the external spermatic, and is situated more internally; it gives two small branches to the transverse fascia, &c., and then passes through the internal and external rings, to terminate in the skin about the pubes, and the spermatic chord or round ligament, and communicate with the branch sent from the branch 2 P. XXIV.

The posterior trunk passes between the transverse processes of the first and second lumbar vertebræ, it gives filaments to the small muscles and the sacro-lumbar, and pierces these and the tendon of the broadest muscle of the back, and after communicating with a branch of the second lumbar nerve, terminates in the skin over the posterior part of the ilium.

THE SECOND LUMBAR NERVE.

The anterior trunk communicates with the sympathetic nerve and the first lumbar, and twice with the external spermatic 22 P. XVIII. of the first lumbar; it gives a filament to the square muscle of the loins. A large branch, called the external cutaneous, pierces the posterior part of the psoas muscle, and sends one to join the internal cutaneous branch, and then passes behind Poupart's ligament, close to the anterior and superior spinous process of the ilium, and is distributed to the skin on the outer side of the thigh. The principal portion of the trunk gives a branch to the psoas muscle, passes down to join the third lumbar nerve to form part of the anterior crural and obturator nerves, and near this point of union sends off a branch which pierces the great psoas muscle; it then passes underneath Poupart's ligament, and gives branches in its course to the skin on the middle and anterior part of the thigh as far as the knee. Sometimes part of this branch terminates in the psoas muscle, whilst the rest joins the anterior crural, and then a corresponding cutaneous branch is given off from this nerve. A slender branch from the first or second lumbar nerve is usually given off to accompany and distribute filaments on the external iliac artery.

The posterior trunk gives filaments to the small muscles and the sacro-lumbar, and pierces these and the tendon of the broadest muscle of the back, to terminate on the skin at the posterior part of the ilium.

THE THIRD LUMBAR NERVE.

THE anterior trunk communicates with the sympathetic, and the second and fourth lumbar nerves, and gives a branch to the square muscle of the loins; it forms a principal part of the anterior crural, and gives a branch to the obturator nerve.

The posterior trunk gives filaments to the small muscles and the sacro-lumbar, pierces these and the tendon of the broadest muscle of the back, and, after communicating with the posterior branch of the second, terminates in the skin at the side of the pelvis; frequently it terminates entirely in the muscles.

THE FOURTH LUMBAR NERVE.

THE anterior trunk communicates with the sympathetic nerve; it becomes connected with the obturator and anterior crural nerves, and then passes down to join the fifth lumbar as it proceeds to the sciatic nerve.

The posterior trunk is distributed entirely to the small muscles and the sacro-lumbar.

THE FIFTH LUMBAR NERVE.

IT passes out between the fifth lumbar vertebra and the sacrum. The anterior trunk communicates with the sympathetic nerve; it forms a junction with the fourth, and the first sacral, to terminate in the sciatic nerve.

The posterior trunk, after communicating with the posterior trunk of the first sacral, terminates in the small muscles and the sacro-lumbar.

THE FIRST SACRAL NERVE.

THE anterior trunk passes out at the first anterior sacral foramen; it communicates with the sympathetic, and then passes to the sciatic nerve.

The posterior trunk passes out at the first posterior sacral foramen; it communicates with the posterior trunk of the fifth lumbar nerve, and, after giving some minute filaments to the sacro-lumbar muscle, joins the posterior trunk of the second sacral nerve, and sends filaments to the skin.

THE SECOND SACRAL NERVE.

THE anterior trunk passes out at the second anterior sacral foramen; it communicates with the sympathetic nerve, and gives a branch to the pyriform muscle; it sends a branch behind the third sacral nerve to communicate with the fourth; it gives off a branch to be joined by one from the fifth lumbar, and pass behind the superior sacro-sciatic ligament to the internal obturator muscle; it then joins the sciatic nerve.

The posterior trunk passes out at the second posterior sacral foramen; it gives filaments to the sacro-lumbar muscle, and joins a branch from the posterior trunk of the third sacral, it then becomes a nerve of considerable size, and passes downwards and outwards to terminate in the skin over the junction of the sacrum with the ilium.

THE THIRD SACRAL NERVE.

THE anterior trunk passes out at the third anterior sacral foramen, and communicates with the sympathetic nerve. It gives filaments to the pyriform muscle; it communicates with the fourth sacral, and gives a branch to join others from the fourth, and unite with the termination of the hypogastric plexus in the broad membranous

expansion, which gives off numerous branches to the rectum, bladder, vesicula seminalis, vas deferens, and prostate gland. The principal part of the nerve, after communicating with the sciatic, and the gluteal plexus, terminates in the internal pudendal nerve. The internal pudendal nerve then passes between the sacro-sciatic ligaments; it sends a large branch along the back of the penis, giving filaments to the skin and the surface of the cavernous body, and then dividing into several branches, which pass near the urethra in the substance of the glans, and send filaments through different parts of this body to terminate on the surface, and particularly about the orifice of the urethra; the rest of the nerve then divides into numerous branches, which are distributed to the sphincter and skin of the anus, the scrotum and its septum, and the skin at the anterior surface of the penis. In the female the dorsal branch passes to the clitoris, and the parts about the extremity of this; the rest of the nerve is distributed on the sphincter of the anus and vagina, and the adjacent skin.

The posterior trunk passes out at the third posterior sacral foramen, and communicates with the posterior trunk of the second and fourth, and is continued downwards and forwards, to give filaments to the skin.

THE FOURTH SACRAL NERVE.

The anterior trunk passes out at the fourth anterior sacral foramen; it communicates with the sympathetic nerve and the second and third sacral, and unites with a branch of the third sacral and the hypogastric plexus to terminate in the rectum, bladder, &c.; it communicates with the anterior trunk of the fifth, and gives filaments to the levator of the anus and the coccygeal muscle, and then passes between some fibres of the superior sacro-sciatic ligament, to give filaments to the sphincter of the anus, communicate with the internal pudendal nerve, and terminate on the skin about the anus.

The posterior trunk passes out at the fourth posterior sacral foramen. It communicates with that of the third and fifth, it passes downwards, gives filaments to the skin about the bone of the coccyx, and then winds upwards to terminate in the skin at the back of the sacrum.

THE FIFTH SACRAL NERVE.

THE anterior trunk passes out between the sacrum and the bone of the coccyx; it communicates with the sympathetic nerve, and the anterior trunk of the fourth, and gives filaments to the coccygeal muscle, and terminates in the skin of the anus.

The posterior trunk passes out between the sacrum and the bone of the coccyx, and communicates with the posterior trunk of the fourth, and terminates in the skin near the extremity of the bone of the coccyx.

THE SIXTH SACRAL NERVE.

THIS, when present, usually communicates with the fifth, and terminates in the skin near the extremity of the bone of the coccyx. Sometimes the sixth appears to divide into two parts before escaping from the spinal canal. Sometimes filaments are observed to terminate on the membrane lining the spinal canal.

THE ANTERIOR CRURAL NERVE.

IT is formed by the principal part of the second, third, and fourth lumbar nerves, and generally also by the first; it passes at the posterior part of the great psoas muscle, and then on the outer side of this upon the internal iliac muscle; it gives branches to the psoas and internal iliac muscles, and passes underneath Poupart's ligament, where it is situated exteriorly to the sheath containing the femoral artery; it gives off many branches, and for the sake of convenience the most exterior will be described first.

The first branch is given to the straight muscle. The second gives a branch to the upper part of the external vast muscle, and sends a filament upwards to the hip joint, it then divides and terminates in the lower part of the external vast and crural muscles.

The third terminates in the crural and internal vast muscles. The fourth terminates in the sartorius muscle. The fifth divides into four branches; two of these pierce the fibres of the sartorius muscle, the most external passes downwards and divides into two branches, one of which terminates in the skin just above the patella, the other in the skin at the inner side of the knee, the most internal one communicates with a portion of the sixth branch, and terminates in the skin at the middle of the thigh; the other two branches terminate in the sartorius, one reaching towards the insertion before it is finally lost. The sixth divides into two, one passes down on the outer side of the femoral artery, and sends a filament from under the sartorius muscle to communicate with the cutaneous branch of the obturator nerve and terminate in the skin; it then passes in a fold of fascia over the tendon of the great head of the triceps muscle, communicates with the saphenus nerve, and gives a filament to accompany an artery near the knee; the second branch passes downwards and divides into two; one of these gives filaments to the skin and terminates in one of the branches of the saphenus nerve passing from underneath the sartorius muscle, the other communicates with the cutaneous branch of the obturator nerve, and then terminates with a small artery at the lower part of the thigh. The seventh is given to the skin at the upper and inner part of the thigh. The eighth passes along with, and gives filaments to, the saphena vein. The ninth divides behind the femoral artery to terminate on the pectineal muscle. The tenth is usually termed the saphenus nerve; it passes down on the outer side of the femoral artery, and after piercing some fibres of the tendon of the triceps muscle divides into two branches; one again divides and sends one branch underneath the external edge of the lower part of the sartorius muscle, gives filaments to the skin and ligaments at the inner side of the knee, and passes below the patella, and sometimes through the bursa placed over the patella, to give filaments to the skin and ligaments on the outer side of the knee; the other also passes from underneath the external edge of the sartorius muscle, gives a filament to the skin and joins the continuation of the saphenus nerve; the second, which is the continuation of the saphenus nerve, sends a filament to the capsular ligament of the knee joint, and then passes from underneath the external edge of the sartorius muscle, and is continued downwards near the inner edge of the tibia along with the saphena vein, and gives filaments to this and the fascia and skin throughout its course; it passes over the inner ankle, generally as far as the great toe, and frequently forms a communication with a branch of the peroneal nerve near its termination.

THE OBTURATOR NERVE.

It arises from the second, third, and fourth lumbar nerves, or rather from the anterior crural; it passes through an aperture in the ligament covering the obturator foramen; it then gives a branch to the external obturator muscle and the hip-joint; it passes between the pectineal muscle and the short head of the triceps, and gives a branch to the short and long heads of the triceps; it is continued behind the long head, and then between the inner surface of this and the gracile; it gives a branch to this muscle, and sends another to terminate on the skin at the inner part of the thigh, and communicate with both divisions of the sixth branch of the anterior crural nerve.

THE SCIATIC PLEXUS.

It is formed by part of the fourth lumbar nerve, the fifth, the first sacral, the second, and part of the third; these communicate and give off the internal obturator nerve, and the gluteal plexus, whilst the principal part terminates in the sciatic nerve.

The internal obturator nerve is formed by a branch from the fifth lumbar and the second sacral; it passes behind the superior sacro-sciatic ligament, and then forward round the inferior edge of this to terminate in the internal obturator muscle.

The superior portion of the gluteal plexus is formed of a large branch from the junction of the fourth and fifth lumbar, and one from the first sacral; its branches pass out above the pyriform muscle, communicate together, and terminate in the middle and smallest gluteal muscles, after sending a branch forward underneath the middle one, to the tensor muscle of the fascia of the thigh. The inferior portion of the gluteal plexus is formed of two large branches from the second sacral, one from the first and third, and others from the posterior part of the junction of these nerves with the fourth and fifth lumbar in the sciatic nerve; this portion of the plexus passes out at the ischiatic notch below the pyriform muscle, and gives branches to the largest gluteal; several branches pass from beneath the lowest edge of this muscle; some of

these are distributed to the skin about the tuberosity of the ischium; one winds forward over the descending branch of the bone of the pubes to the skin near the labium, and communicates with the internal pudendal nerve; others are given to the skin behind the great trochanter, and two long cutaneous branches descend on the posterior part of the thigh, and give many filaments to the skin, and terminate on each side a little below the ham.

A branch is sent from the posterior part of the sciatic nerve, just as it passes through the ischiatic notch; it gives filaments to the geminous muscle, and then passes behind this and the tendon of the internal obturator, to give a filament to the posterior part of the capsular ligament of the hip joint, and terminate in the square muscle of the thigh.

THE SCIATIC NERVE.

The sciatic nerve is sometimes one trunk, and sometimes divided by the interposition of a portion of the pyriform muscle; it passes out of the pelvis at the ischiatic notch below the pyriform muscle, and over the geminous and square muscles between the tuberosity of the ischium and the great trochanter; it emerges from underneath the lower edge of the largest gluteal muscle, and then passes down at the back of the triceps, and gives off the large nerve termed peroneal. Sometimes this division takes place within the pelvis, and the two nerves are separated by the whole, or a portion of the pyriform muscle. Usually before the separation, or when this has taken place very high, the continuation of the sciatic gives branches to the semi-membranous and semi-tendinous muscles, the biceps and large head of the triceps, but these are not given off in the same manner in every subject. One branch sometimes from the sciatic, and sometimes from the peroneal, passes deep in the ham to terminate on the capsular ligament and synovial membrane on the outer side of the knee joint, another from the sciatic passes over the origin of the inner portion of the gastrocnemius muscle, and winds round to terminate on the inner side of the knee joint. The sciatic passes down at first behind and then rather to the inner side of the popliteal artery; it gives off the communicating tibial branch, which, in passing downwards on the posterior part of the external gastrocnemius, is frequently covered for a short distance by some

muscular fibres, and below the middle of the leg joins the long cutaneous branch of the peroneal nerve; it then gives branches to each gastrocnemius, and one to the plantar and popliteal muscle; it gives off a branch dividing into three others, the smallest passes some way down the leg to terminate on the periosteum of the fibula, another on the posterior tibial muscle, and the third on the internal gastrocnemius; it may now be termed the posterior tibial nerve, and having the posterior tibial artery, after separating from the fibular, on its inner side. It gives a branch to the long flexor of the toes, and to the long flexor of the great toe. From its inner side a branch is given off which divides into two filaments; one to pass with a small artery to the fascia of the leg, the other to the ligaments at the lower end of the tibia. On the outer side two branches pass downwards to terminate on the bursa and fascia near the insertion of the tendon of Achilles. Lower down a branch passes behind the posterior tibial artery, and communicates with one of those given to the skin on the inner side of the heel, and then joins the inner plantar nerve. Just above the annular ligament, extending from the inner ankle to the heel-bone, it gives branches to the skin and fascia, and also to the periosteum on the inner surface of the heel-bone; but these are sometimes given off from the external plantar nerve, when the division has taken place higher up; it then passes underneath the annular ligament and separates into two principal divisions, the outer and inner plantar nerves; these pass to the sole of the foot underneath the origin of the adductor muscle, and the short flexor of the toes. The inner plantar nerve sends several filaments to the short flexor muscle of the toes and the abductor of the great toe, and then gives off four branches; the first, in passing to the great toe, gives a branch to the skin, and then having communicated with a branch from the deep plantar nerve sent to the adductor of the great toe, terminates in the short flexor of the great toe: it sends a long branch to the joint between the metatarsal bone and first phalanx, and then terminates on the skin and ligaments at the inner side of the great toe; the second branch gives a filament to the first lumbrical muscle, and divides to terminate on the outer side of the great toe and the inner side of the second; the third branch divides to terminate on the outer side of the second and the inner side of the third; the fourth branch divides to terminate on the outer side of the third and the inner side of the fourth. The outer plantar nerve sends a branch under the heel-bone to supply part of the short flexor of the toes, and be then continued under the fascia to the abductor of the little toe. After giving a branch to the accessory flexor, it crosses underneath the short flexor of the toes on the inner side of the plantar

artery, and sends off its internal branch, which communicates with the most external one of the inner plantar nerve, and terminates in the skin and fascia in passing to the external side of the fourth, and the inner side of the little toe; a branch gives some filaments to the skin at the outer side of the foot, and then terminates on the outer side of the little toe; another branch gives filaments to the skin on the outer side of the foot, and sends a filament to the ligaments of the tarsal joints. The deep portion of the outer plantar nerve, gives branches to the short flexor of the little toe, and the last lumbrical muscle; it then proceeds, accompanied by the external plantar artery, and gives filaments to the third and second lumbrical muscles, and the transverse; it sends off a branch, which gives filaments to the upper surface of the adductor of the great toe, and then passes between some of the fibres to the under surface, to give more filaments to this muscle, and be continued by the side of the short flexor of the great toe, to communicate with the branch given to this muscle, from the branch of the inner plantar nerve sent to the inner side of the great toe; the rest of the deep branch then passes underneath the adductor of the great toe with the plantar artery, gives filaments to this muscle, and terminates in the interosseous muscles.

The peroneal nerve divides into several principal branches. The first gives a branch to the short head of the biceps muscle, and then passes downwards towards the external condyle of the thigh bone, to terminate on the ligaments and synovial membrane on the outer side of the knee joint. In some subjects this branch is much larger, and is then continued downwards on the outer side of the leg, giving filaments to the skin in its course, instead of another sent off by the long cutaneous branch of the peroneal. The second is a long cutaneous branch; it passes down on the outer side of the leg, giving a considerable branch near its origin to the skin, as well as others throughout its course; it then passes down, and about the middle of the leg receives the communicating tibial branch; lower down it gives a branch to the fascia and skin at the back of the heel, and also a large branch and several small ones to the skin, ligaments, and periosteum on the outer side of the heel bone; it then passes underneath the outer ankle, gives some filaments to the ligaments, and divides into two branches; one communicates with the dorsal branch of the peroneal, and gives many filaments to the ligaments, fascia, and skin of the foot; the other terminates on the skin at the external side of the little toe, and also gives filaments to the skin and fascia in its course. The third, which is the principal continuation of the peroneal, is a large nerve; it passes forwards underneath the beginning of the long peroneal muscle, and divides into branches. One is

directed upwards and inwards, gives filaments to the origin of the common extensor of the toes, the anterior tibial muscle, the long peroneal, the capsular ligament of the knee joint and that of the tibia and fibula, the periosteum of the tibia, and the interosseous ligament. Another, usually termed the anterior tibial, passes behind the belly of the common extensor of the toes, and gives branches to this and the anterior tibial muscle; it then accompanies the anterior tibial artery, and gives filaments to the long extensor of the great toe; it passes behind the tendon of this muscle, and, underneath the annular ligament, gives off, from its outer side, a branch to form a ganglionic enlargement or expansion, which divides and gives filaments to the capsular ligament of the ankle, the metatarsal joints, the short extensor of the toes, and the interosseous muscles; the continuation of the anterior tibial nerve passes forward externally to the anterior tibial artery, and sends off a branch, giving filaments to the artery, and dipping down with this towards the sole, terminates in the joint of the metatarsal bone of the great toe with the internal cuneiform bone; it then passes in the space between the metatarsal bone of the great toe, and the one next to this, and gives one branch to the skin at the outer side of the great toe, and another to the skin at the inner side of the second toe. The continuation, or dorsal branch of the peroneal, directs its course between the heads of the long peroneal muscle, and the common extensor of the toes; it gives branches to these, and then emerging and passing downwards, underneath the skin, gives filaments to the periosteum on the inferior part of the fibula, and the middle and third peroneal muscles; it passes over the annular ligament, gives filaments to this, and then divides into two principal branches; the most internal sends a branch, which crosses the tendon of the long extensor of the great toe, to terminate on the skin at the inner side of the foot and the great toe, and another to give filaments to the skin of the foot, and terminate on the outer side of the second toe, and the inner side of the third; another branch divides and supplies the external side of the third, and the inner side of the fourth toe, the external side of the fourth, and the inner side of the little one, and gives filaments to terminate on the skin at the outer side of the back of the foot, and communicate with a branch of the long cutaneous.

In the prosecution of this work, every endeavour has been used for representing clearly and accurately the complicated preparations on which it has been entirely founded. If instruction is the principal object of anatomical plates, and not the gratification of the

imagination, distinctness must be the leading feature; and therefore the rules of the artist must in some measure be infringed upon, as it is often impossible to give all the minute parts clearly in detail, and preserve the proportionate degrees of light and shade necessary for the perfection of the whole. So long as the principal objects are intelligibly delineated, plates will convey such information respecting the precise situation of the most minute and intricate parts, as cannot be derived from words, however carefully and judiciously these may have been selected and arranged.

In treating of the nerves generally, many minute but important filaments must be so cursorily mentioned as almost to escape notice; but if description were carried to the utmost extent, there would still remain appearances, which neither words nor graphical representations could convey to others. A very particular notice of the most minute researches would border upon the department of physiology; and although this might prove highly interesting to a few, yet, embodied amidst a series of anatomical facts, it might perplex many others, by producing a considerable degree of confusion. It is, however, absolutely necessary that some points previously mentioned should be reverted to and enlarged upon, otherwise misconceptions might arise, as to the extent of the investigations, out of which this work has been constructed.

Whoever prosecutes the anatomy of the nervous system attentively, adverting, at the same time, to its physiology and pathology, as far as these are already known, can hardly fail of being convinced that every organised part of the animal body is supplied with nerves. And as different degrees of perception are called for in different parts, so these are more or less supplied with nervous branches accordingly. The organs of the senses are very important, and are therefore furnished with the greatest number. Next in importance are the muscles, whose actions are of such concern to the body, and these are furnished with nerves in proportion. The viscera, the glands, and blood-vessels, receive many nerves; but the bones, tendons, &c., are passive, and contain only a small proportion, no more indeed than might be supposed necessary for maintaining such a degree of living action as would preserve them from injury, and form that connection with every other part, required for the harmonious discharge of the functions of the whole. With such a variety in the distribution of nerves, can it be a matter of wonder, that there should be so much difficulty in tracing the small branches in the least sensible parts; or because the demonstration cannot always be accomplished, are these to be considered destitute? Certainly not, for if nerves have been satisfactorily exhibited under peculiarly favourable circumstances, the difficulty, or even the failure of accomplishing

such dissections generally, is no proof either against their reality in the few examples, or their existence in every subject.

So complicated is the structure of an animal body, that, however diligent the anatomist may be in acquiring the art of separating its different textures, it is impossible for him to see how the ultimate particles are disposed. The arteries and veins, and absorbents, may be so filled with different substances, as to be traced with accuracy to the utmost degree of minuteness. But with the nerves it is very different, for these the anatomist can only trace to a certain extent, with a sufficient assurance, that what he is following is nerve. When he gets beyond this point, the surrounding parts become so similar to the nervous filaments as to make the separation and dissection difficult, but not so much so as has been generally imagined. By the most careful dissection nerves may be followed to their termination in a delicate membrane, which will be found on investigation with a magnifying glass to consist of a plexus of very minute filaments.

Many are apt to be too much guided by notions they have early imbibed respecting the form, substance, &c., of various parts of the body, and cannot at first reconcile it to themselves with regard to the nerves, that any thing in the form of a thin membrane can perform the functions of a round or thick rope-like substance. Nevertheless this is seen in the termination of the optic nerve in the retina, and admitted because it is so obvious, for it is so slightly connected with the other membranes as to be easily separated, and examined in the most satisfactory manner. But in some parts of the body the nerves become interwoven with organs of so firm a texture as not to be capable of the separation necessary for exposing their exact termination, whilst in others this may frequently be seen in the form of a fine membrane. The nerve supplying a muscle terminates in a fine membrane, which is extended amongst the fibres, and is contiguous with that usually termed cellular. When it has resolved itself into this membrane, and has to spread itself over the whole of a muscle, because it cannot be followed into all the fibres, will it be asserted that these are destitute? And if this cannot be fairly maintained; in like manner, when a nerve has been traced to any other part, and its termination found similar to that in the muscle, may it not be concluded that the whole of this part is likewise supplied with nerves?

If physiological anatomy is be pursued with success, and particularly that relating to the nervous system, all the minute branches of nerves should be traced to their destination; thus when a filament is found to end in a transparent membrane, it cannot be separated further without destroying altogether its attachment, but however far it may

have been followed, so long as it does not decrease it should be pursued with care, as it will be often found to lead to a part that has been considered destitute of nerves, and will be seen to enter a joint or a bone after passing through muscular fibres, when it might have been supposed to terminate in these. Minute branches of nerves can be traced to a considerable distance in various parts without any decrease; it may, therefore, be supposed, that, after this extension, their functions would not be well performed; but length does not seem to diminish their power, as in different animals the same nerve, for the same purpose, is found lengthened according to the greater thickness or extent of the part it has to pass over to its destination.

Besides the different degrees of sensibility imparted by the size and number of the nerves in the various organs, other properties are produced by their particular connexions, but these points cannot now be satisfactorily investigated. It may, however, not be useless to remark that some of these exist entirely for producing sympathies, whilst others are so very extensive, and particularly between branches of different systems, as to be intended for exciting modified actions for the important and varying condition of several organs in health and disease. This arrangement is well observed in the distribution of the nerves to the bladder and rectum. The kidneys and the large intestines are entirely supplied by the sympathetic nerves; but the bladder and rectum are furnished from the intermixture of the hypogastric plexuses with branches from the third and fourth sacral nerves, so that their sensations are not only thus modified, but their actions are not kept altogether under that control of the will, which would have been very hazardous in many states of the body, and particularly in infancy, and those diseases affecting the sensorium. The urethra and the muscles connected with its functions, and the sphincter of the anus, are entirely supplied with the pudendal branches from the spinal nerves. In the rectum the intermediate change, from the involuntary powers of the sympathetic to those placed entirely under the command of the will, is most beneficently adapted to the comfort and convenience of man, for it would have been impossible for the sphincter otherwise to have resisted the continued action of the intestines, and it would have been equally unsafe for the system generally to have had this part wholly under the influence of the will.

The arteries are plentifully supplied with nerves, but not all in the same degree, and these are particularly conspicuous on the aorta, which receives numerous branches from each sympathetic nerve; the divisions of the carotid, the subclavian as far as the axilla, and those of the viscera of the abdomen are also freely supplied. The arteries of the

other parts are more scantily furnished, and frequently by the nearest nerves. In the hand there is a curious connexion of some of the digital nerves with the digital arteries. This usually takes place in the branch of the median, about to form a digital nerve for the middle finger, and that of the ulnar destined for the ring finger, and it is so remarkable, and so different from that of the other nerves of the extremities, as to leave no doubt of its presence for some specific purpose.

The nerves are supplied with blood by the nearest arteries; consequently those, extended through a long course, receive contributions from many different branches. The trunks and large branches do not seem to require any co-operation of the arteries, except for specific purposes, as in the connexions necessary for keeping up a continual action either of particular muscles, or a more acute degree of perception in some sentient organs. The nerves, however, on reaching their destination are usually accompanied by corresponding arteries, and in some parts there is an interlacing of the minute ramifications, as in the termination of those in the fingers; but in others there is only an approximation, as between the retina and choroid coat. The phrenic nerve is not accompanied by its proper artery until it has reached the diaphragm. The trunk of the median nerve passes along with the humeral artery in the arm, and the branches then given off are accompanied by corresponding arteries; again it is continued through the fore arm alone, and at its division in the hand each branch is joined by a digital artery. This difference with respect to the trunks and large branches of the nerves and arteries will be found in many instances.

Sometimes veins are encircled by nerves, but not in the same close manner as by those surrounding the digital arteries. The veins are scantily supplied with nerves in comparison with the arteries; filaments may however be generally traced on those at the bend of the elbow, and on the saphena vein, particularly at the lower part of the leg; but whether these vessels at their origin in the skin be more intimately connected with the nerves, for the purpose of regulating the perspiration, is difficult to determine, as it is remarkable that so many and such large nerves are continued underneath the skin in the direction of the cutaneous veins.

A nerve has been traced to the thoracic duct from the aortic plexus; it is almost impossible to trace nerves to the small absorbent vessels, but from the numerous terminations of these along with branches of the sympathetic in the cellular tissue on each side of the spine, no question can be entertained respecting their connexion. The nerves usually traced to the absorbent glands have been from the par vagum and the

sympathetic, but it is most probable the rest have a supply from the nearest branches. Nerves may be traced from the sympathetic to the peritoneum forming the mesentery, and likewise to the pleura, and also to the latter membrane from the par vagum. Filaments may be traced from the par vagum, phrenic, and sympathetic nerves to the pericardium. The salivary glands are plentifully supplied with nerves; the parotid receives branches from the facial and the superficial temporal; the submaxillary and sublingual glands receive branches from the gustatory, and in one preparation a branch is sent to the sublingual from the ninth; filaments from the pharyngeal plexus accompanying the arteries are also given to these glands.

Branches of nerves have often been seen in the teeth and the surrounding bone, but there is difficulty in tracing them into the substance of the bones of the extremities. In a section of the tibia, the lower part of which had been diseased, a branch of considerable size from the enlarged saphenus nerve was observed entering it. A branch was also sent from the posterior tibial nerve, which distributed many filaments on the periosteum and bone of the fibula. Nerves may be traced to the tendons in the back of the hand and fingers, from the radial branch of the spiral and the dorsal branch of the ulnar; in the palm filaments from the digital nerves may be seen passing into the sheaths, and entering the tendons invested by portions of the synovial membrane, thus forming the bands or folds at the back of the tendons. Numerous branches may be also traced to the fascia in various parts of the body.

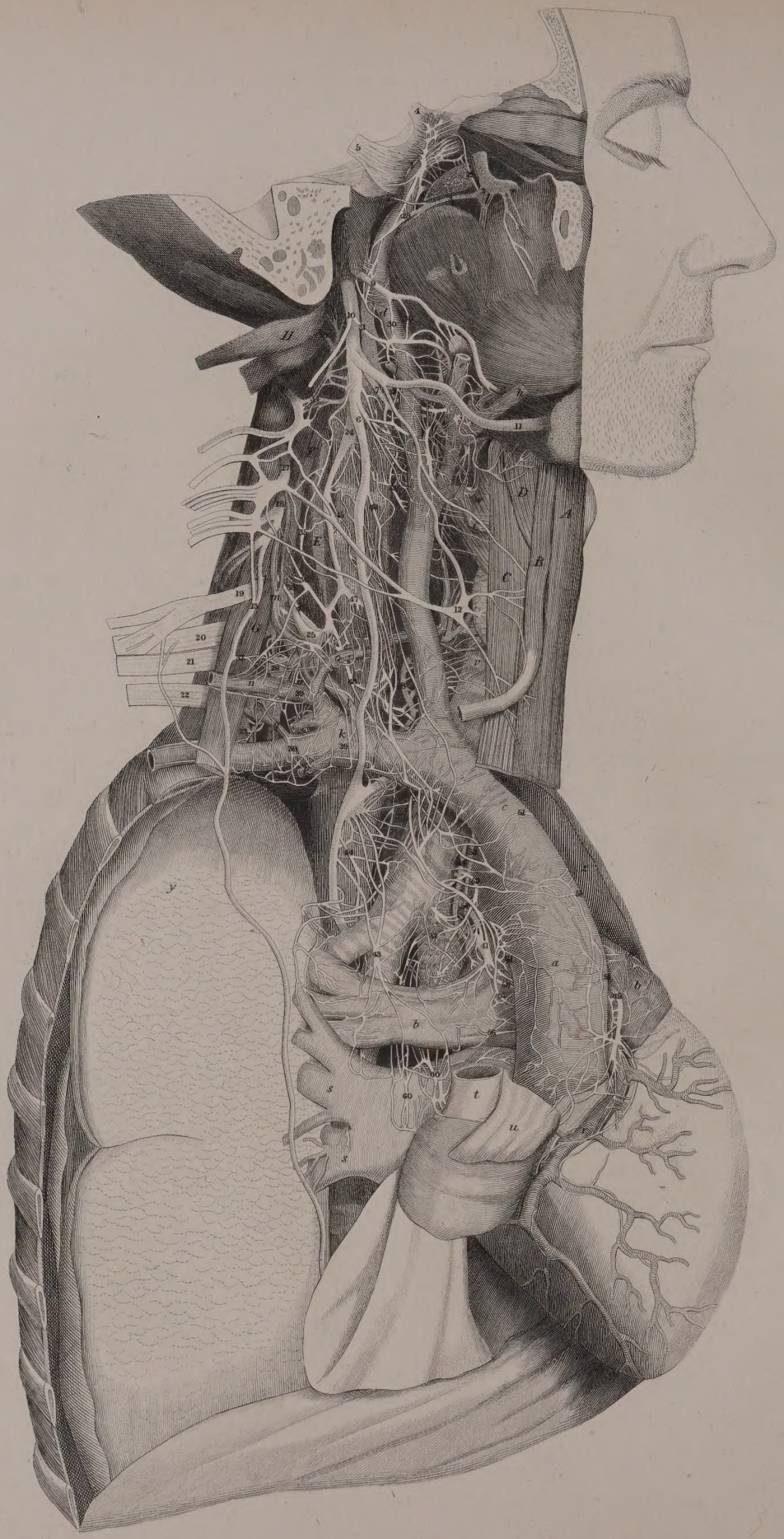
The joints are more extensively supplied with nerves than is usually supposed; the demonstration of these is however attended with some difficulty, and is generally effected when the other nerves are also minutely examined. It is not always possible to trace the filaments to the synovial membrane, but only to the ligaments. All the nerves of the joints do not observe the some mode of distribution, as some terminate entirely on the ligaments and synovial membrane, whilst others at the same time supply the superincumbent skin. The joints may be considered as simple or compound, according to the manner of their being furnished with nerves: simple when a branch terminates entirely on the joint, as in that of the hip, the shoulder, and jaw; compound when the branch distributes part of its filaments at the same time on the skin. If a branch be sent from the midst of a muscle or other part, and no filament of this be afterwards given to the skin, the joint may still be considered as simple; but it may nevertheless be worth while to ascertain whether this connexion with the muscle may influence the joint in a different manner from that with the skin, and particularly

in morbid affections. The shoulder joint receives a filament from the circumflex nerve on its anterior part, and on its posterior from the superior scapular. The hip joint receives a filament on its anterior part from the anterior crural nerve and the obturator, and on its posterior from the branch of the sciatic supplying the geminous and quadrate muscles. The next in simplicity are the wrist and ankle: these for the most part are covered by tendons, so that only small portions are directly connected with the fascia and skin. The wrist receives nerves on its anterior and exterior part from a branch arising from the radial, and its anterior and inner part from a branch of the dorsal of the ulnar, just after this has left its trunk; it receives nerves on its posterior part from the radial, and the dorsal branch of the ulnar, and from the ganglion in which the continuation of the spiral terminates, and this also gives filaments to the carpal joints. The ankle on its anterior part is superficially supplied by various branches of the saphenus nerve and the dorsal branch of the peroneal, and its deeper parts by that portion of the deep branch of the anterior tibial forming a ganglionic or membranous expansion, and supplying also the tarsal joints; it is supplied on each side and posteriorly by branches from the posterior tibial, and the long cutaneous branch of the peroneal. The next in order are the knee and elbow. The anterior part of the knee receives considerable branches from the saphenus nerve; one of these, in passing to the exterior side of the joint, frequently traverses the synovial bag placed over the patella; these branches are distributed chiefly to the skin and ligaments; a branch from the peroneal is sent up from the midst of the origin of the anterior tibial muscle to the capsular ligament; those on the posterior part are placed deeply in the ham, and pass from the sciatic or peroneal nerves on each side of the joint to terminate on the synovial membrane and ligaments. The elbow is supplied on its inner side by a branch from the ulnar nerve, on its outer side by a branch from the spiral; the skin and fascia and ligaments at its posterior part are supplied by the internal and small internal cutaneous nerves, and the cutaneous branches of the spiral. The most complicated joints are those of the fingers and toes; the anterior or palmar and plantar surfaces are covered by tendons, so as to be placed very much in the condition of the posterior parts of the knee and elbow; on the posterior surfaces the nerves of the skin, fascia, tendons, and joints, are so connected together, as to make it reasonable to suppose that in some diseases each part can hardly fail of being implicated with the rest. The capsular ligament of the lower jaw receives filaments from one of the temporal branches of the third trunk of the fifth nerve. The vertebræ and their ligaments anteriorly are supplied by the sympathetic,

and are thus connected with the viscera, as some of the other joints are by their nerves with the skin; it may therefore be a question whether the former suffer from disorders of the viscera, in a similar but modified manner to that in which the latter do from cold or diseases affecting the skin. Some filaments have been traced to the posterior parts of the spine from the spinal nerves, near the separation of these into the anterior and posterior trunks.

When the dissection of the human body shall have been brought to a great degree of perfection, there still will remain parts so obscure as to need further elucidation; but it is difficult to determine the extent to which the separation should be carried for the advantage of science. It is possible to sever connecting filaments without any appearance of violence; and if hasty deductions be made from such dissections, the most incorrect doctrines must be the result. Such a source of confusion can only be obviated by the most scrupulous investigations, and by the assistance of comparative anatomy. The most extended and careful researches in this wide but interesting field of inquiry, should therefore be encouraged by those who preside over the medical profession; and students should neither be absolved nor deterred from such duties by any consideration either of their impossibility or inutility, as the human capacity has neither yet been measured, nor the proper application of knowledge ascertained. For various reasons minute anatomy should be anxiously cultivated; by the man who would understand the groundwork of his profession, it ought to be considered a subject of intense interest and the utmost importance; and indeed if it were only for the satisfaction of observing the order, the beauty, and wisdom of the contrivances, which minister to the production and support of human ingenuity alone, it could not fail of exciting the most exalted sentiments that man is capable of experiencing.

The author cannot let the present opportunity pass without expressing his gratitude to Dr. Monro and the late Mr. Fyfe, for their assiduous instructions in minute anatomy, whilst he was a student in the University of Edinburgh; to Sir Astley Cooper, for that disinterested notice, which gave him the first impulse towards scientific researches, and afterwards encouraged those exertions, which have conducted him so far to professional distinction; to the late Mr. Abernethy, for the public-spirited liberality evinced towards him, when an entire stranger; and to Sir Anthony Carlisle, for the greatest kindness and assistance throughout the whole progress of this work.



Drawn by West.

Engraved by Findon.

PLATE I.

In the preparation represented by this plate, the vertex and side of the skull have been removed, and the pterygoid process of the sphenoid bone cut away so as to expose the spheno-palatine ganglion: the carotic canal, and that containing the Vidian nerve, have been opened: the ribs have been cut away near their angles: the parts about the larynx and pharynx have been drawn from their situation to afford room for displaying the nerves: the heart has been placed so as to exhibit the nerves accompanying the anterior coronary artery, and the aorta raised and drawn to the left side for showing the nerves passing behind it: the diaphragm has been loosely folded over the inferior part of the preparation.

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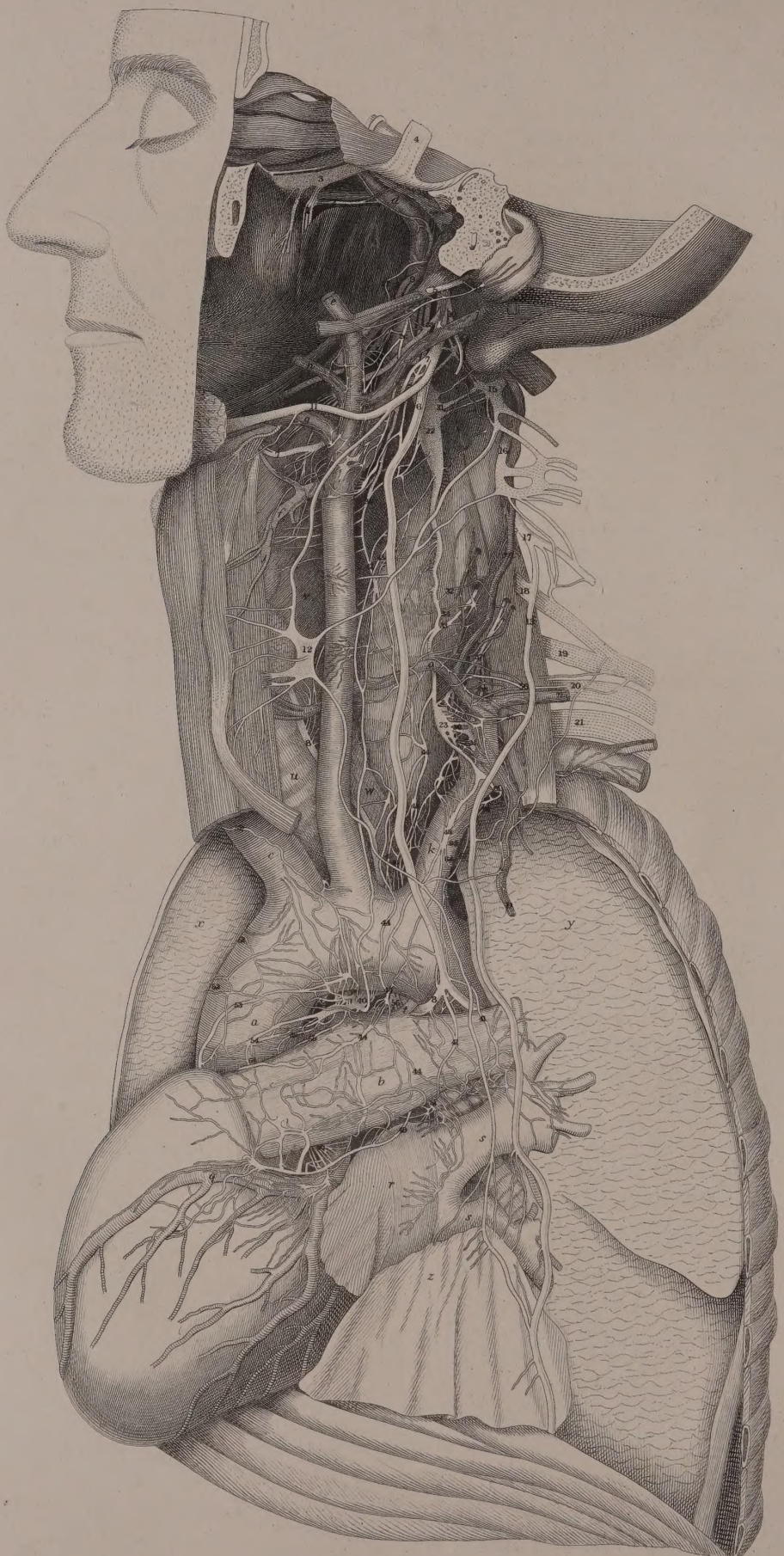
a Aorta.
b Pulmonary artery and its right branch.
c Innominata.
d Internal carotid artery.
e External carotid artery.
f Superior thyroideal artery.
g Lingual artery.
h External maxillary artery.
j Occipital artery.
k Subclavian artery drawn downwards.
l Vertebral artery.
m Anterior cervical artery.
n Posterior cervical artery.
o Inferior thyroideal artery.
p Internal mammary artery.
q Superior intercostal artery.
r Anterior coronary artery.
s Right pulmonary veins.
t Superior cava.
u Right auricle.
v Trachea.
w Pharynx.
x Œsophagus.
y Right lung.
z Left lung.

A Sterno-hyoideal muscle.
B Omo-hyoideal muscle.
C Sterno-thyroideal muscle.
D Thyro-hyoideal muscle.
E Long muscle of the neck.
F Larger anterior straight muscle of the head.
G Anterior scalenus muscle.
H Superior belly of the digastric muscle.

1 Sixth nerve.
2 Spheno-palatine ganglion.
3 Vidian nerve.
4 Second trunk of the fifth nerve divided and turned back.
5 Third trunk of the fifth nerve divided and turned back.
6 Right trunk of the par vagum.
7 Superior laryngeal nerve.
8 Recurrent nerve.
9 Glosso-pharyngeal nerve.
10 Accessory nerve.
11 Ninth nerve.
12 Gangliform membrane, formed by the descending branch of the ninth and a branch from the first, second, and third cervical nerves.
13 Phrenic nerve.
14 Left recurrent nerve.
15 Suboccipital nerve.
16 First cervical nerve.
17 Second cervical nerve.
18 Third cervical nerve.
19 Fourth cervical nerve.

20 Fifth cervical nerve.
21 Sixth cervical nerve.
22 Seventh cervical nerve.
23 First dorsal nerve.
24 First cervical ganglion of the sympathetic nerve.
25 Second cervical ganglion of the sympathetic nerve.
26 Third cervical ganglion of the sympathetic nerve.
27 Superior branch of the Vidian nerve.
28 Inferior branch of the Vidian nerve.
29 A branch of the spheno-palatine ganglion to join the sympathetic in the carotic canal.
30 Two branches of the glosso-pharyngeal nerve to join the pharyngeal plexus.
31 A branch of the accessory nerve to join the pharyngeal plexus.
32 A thick branch from the first cervical ganglion to join the pharyngeal plexus.
33 Part of the pharyngeal plexus, usually termed the external laryngeal nerve.
34 The communication between the first cervical ganglion and the suboccipital and first cervical nerves.
35 The communication between the first cervical ganglion and the prolongation of the sympathetic and the first and second cervical nerves.
36 A branch from the sympathetic communicating with the third cervical nerve and the plexus surrounding the branches of the subclavian artery.
37 A communication with the phrenic, the third cervical ganglion, and the plexus surrounding the branches of the subclavian artery.
38 A branch of the second cervical ganglion accompanying the vertebral artery; its termination will be seen in 44 P. III.
39 Branches proceeding from the second and third cervical ganglia of the sympathetic, and forming a plexus around the subclavian artery and its branches, and communicating with the cardiac and recurrent nerves; these may be considered as forming part of the right lateral cardiac plexus.
40 A branch of the second cervical ganglion joining the fourth cervical nerve, as will be seen in 45 P. III.
41 Ventricular plexus.
42 Auricular plexus.
43 Anterior pulmonary plexus.
44 A branch of the right trunk of the par vagum; its continuation is seen 66 P. III.
45 A nerve forming part of the right lateral cardiac plexus.
46 A branch of the right trunk of the par vagum, forming part of the right lateral cardiac plexus, giving a branch to the sterno-hyoideal muscle, and then passing over the subclavian artery to terminate in the nerve 48 P. I.
47 Forms part of the right lateral cardiac plexus. It sends off many very small branches, and communicates with 45 and 48 P. I., and the plexus surrounding the inferior thyroideal artery.
48 A nerve from the prolongation forming part of the right lateral cardiac plexus, and terminating principally in the ventricular plexus.
49 Is the continuation of 61 P. I., 53 P. II., and divides into branches to pass with the anterior coronary artery to the ventricles of the heart.
50 Is the continuation of 44 P. II.
51. 51. 51 Branches from 48 P. I. continued to 52. 52. 52 P. II. to form communications with a plexus of nerves on the aorta proceeding from the ventricular plexus.
52 A branch of the left recurrent terminating in the auricular plexus.
53 Is the continuation of 45 P. II., and terminates in the ventricular plexus.
54 Is the same as 67 P. IV., and forms part of the communication between the ventricular, the auricular, and the right and left thoracic plexuses, and the left trunk of the par vagum and recurrent.
55 A branch from the ventricular plexus arising near 54, and terminating in the auricular plexus.
56 A branch from the ventricular plexus; it gives a branch to the auricular plexus, then passes behind the right branch of the pulmonary artery; sends a branch to the right to communicate with a branch of the anterior pulmonary plexus, 43 P. I., and passes forward and gives a branch to the pulmonary artery, and at the inferior part of the pulmonary artery forms 49 P. II.
57 The same as 59 P. II.; it gives a branch to the pulmonary artery, and terminates in 50 P. II.
58 Two branches the same as 54. 54 P. II., and terminating in 50 P. II.
59 A branch from the recurrent nerve to the œsophagus, and is the same as 65 P. III.
60 Branches from the auricular plexus to the auricles.
61 Arises from the termination of the nerve 48 P. I. at the ventricular plexus, and is the same as 53 P. II., 49 P. I.



Drawn by West.

Engraved by Finden.

PLATE II.

THIS plate has been taken from the left side of the subject, and the heart has been placed for allowing a demonstration of the nerves accompanying the posterior coronary artery.

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a Aorta.
b Pulmonary artery and its left branch.
c Innominata.
d Internal carotid artery.
e External carotid artery.
f Superior thyroideal artery.
g Lingual artery.
h External maxillary artery.
j Occipital artery.
k Subclavian artery.
l Vertebral artery.
m Anterior cervical artery.
n Posterior cervical artery.
o Inferior thyroideal artery.
p Internal mammary artery.
q Posterior coronary artery.
r Left auricle.
s Left pulmonary veins.
t Remains of the arterial canal.
u Trachea.
v Pharynx.
w Œsophagus.
x Right lung.
y Left lung.
z Pericardium.

1 Spheno-palatine ganglion.
2 Vidian nerve.
3 Second trunk of the fifth nerve.
4 Third trunk of the fifth nerve divided and turned back.
5 Facial portion of the seventh nerve.
6 Left trunk of the par vagum.
7 Superior laryngeal nerve.
8 Recurrent nerve.
9 Glosso-pharyngeal nerve.
10 Accessory nerve.
11 Ninth nerve.
12 Gangliform membrane, formed by the descending branch of the ninth, and a branch from the first and second cervical nerves.
13 Phrenic nerve.
14 Suboccipital nerve.
15 First cervical nerve.
16 Second cervical nerve.
17 Third cervical nerve.
18 Fourth cervical nerve.
19 Fifth cervical nerve.
20 Sixth cervical nerve.
21 Seventh cervical nerve.
22 First cervical ganglion of the sympathetic nerve.
23 Second cervical ganglion of the sympathetic nerve.
24 Third cervical ganglion of the sympathetic nerve.
25 A branch of the facial nerve supplying the superior belly of the digastric and the stylo-hyoideal muscles, and sending a branch on the external carotid to join the pharyngeal plexus.
26 A branch from the glosso-pharyngeal nerve to join the pharyngeal plexus.
27 A branch from the glosso-pharyngeal nerve to join the branches of the sympathetic 29.
28 A branch from the accessory nerve to join the pharyngeal plexus.
29 Thick branches sent from the superior and inner portion of the first cervical ganglion to join the pharyngeal plexus.
30 Part of the pharyngeal plexus, usually termed the external laryngeal nerve.
31 Two branches from the exterior edge of the first cervical ganglion to join the first cervical nerve.
32 A branch from the prolongation of the sympathetic to join the third cervical nerve.

33 A branch from the prolongation of the sympathetic, passing between the fibres of the long muscle of the neck to give a branch to the fourth and fifth cervical nerves, and join the plexus on the vertebral artery.

34 A branch from the prolongation of the sympathetic dividing and sending one branch upwards with a branch of the inferior thyroideal artery to pass deeply between the fibres of the long muscle of the neck; the other to divide and join a branch of 37 and another of 36.

35 A branch from the second cervical ganglion and the plexus on the inferior thyroideal artery to join the phrenic nerve.

36 A branch formed from the plexus surrounding the inferior thyroideal artery, to be distributed chiefly to the absorbent glands and cellular membrane.

37 Arises from the second cervical ganglion, and divides into four branches to pass between the fibres of the anterior scalenus muscle, and join the fourth and fifth cervical nerves.

38 A large branch from the third cervical ganglion to accompany the vertebral artery: its continuation is seen in 43 P. IV.

39 Branches passing from the second to the third cervical ganglion.

40 Ventricular plexus.

41 Left anterior pulmonary plexus.

42 A nerve forming part of the left lateral cardiac plexus.

43 A branch of the left trunk of the par vagum, forming part of the left lateral cardiac plexus, and terminating in the ventricular plexus.

44 A branch forming part of the left lateral cardiac plexus, and ramifying principally on the pulmonary artery, and communicating with the ventricular plexus, the recurrent, and branches of the auricular plexus coming from underneath the pulmonary artery, and part of it is continued to 50 P. I. to communicate with filaments of the branch 49 P. I.

45 Part of the left lateral cardiac plexus; after communicating with the other branches of the plexus and giving a filament to the posterior part of the arch of the aorta, it terminates in the ventricular plexus, 53 P. I. 62 P. IV.

46 Part of the left lateral cardiac plexus; it divides into two branches to pass behind the arch of the aorta, and terminate in 70 P. IV. the communication between the ventricular, the auricular, and the right and left thoracic plexuses, and the left trunk of the par vagum and recurrent.

47 A gangliform enlargement the same as 64 P. IV. receiving branches from the second cervical ganglion, and forming part of the left lateral cardiac plexus; it forms many communications, particularly pointed out in page 13, and terminates in the communication 70 P. IV.

48 A gangliform enlargement forming part of the left lateral cardiac plexus. Its communications are particularly pointed out in page 14.

49 A large branch arising from the ventricular plexus, as may be seen in 56 P. I. It forms several communications, and then accompanies some of the branches of the posterior coronary artery to terminate in the ventricles of the heart.

50 A plexus of branches arising from the ventricular plexus, and passing behind the pulmonary artery from 54. 54 P. II., and accompanying some of the branches of the posterior coronary artery to the ventricles of the heart.

51 A branch of the auricular plexus to terminate in the left auricle.

52. 52. 52 Branches from the other side of the aorta, the same as 51. 51. 51 P. I. to communicate principally with branches of the nerve 48 P. I., forming part of the right lateral cardiac plexus.

53 A large branch from the ventricular plexus, first the same as 61 P. I., and then as 49 P. I., to accompany the branches of the anterior coronary artery to terminate in the ventricles of the heart.

54. 54 Branches arising from the ventricular plexus, the same as 58 P. I., and terminating in 50 P. II.

55 A branch from the ventricular plexus to terminate on the pulmonary artery.

56 A branch from the recurrent, the same as 69 P. IV. communicating with 70 P. IV. and the auricular plexus, and giving filaments to the pulmonary artery and then rejoining the recurrent.

57 Is derived from the branch 66 P. IV.

58 Is also derived from the branch 66 P. IV.

59 The same as 57 P. I., and terminating in 50 P. II.

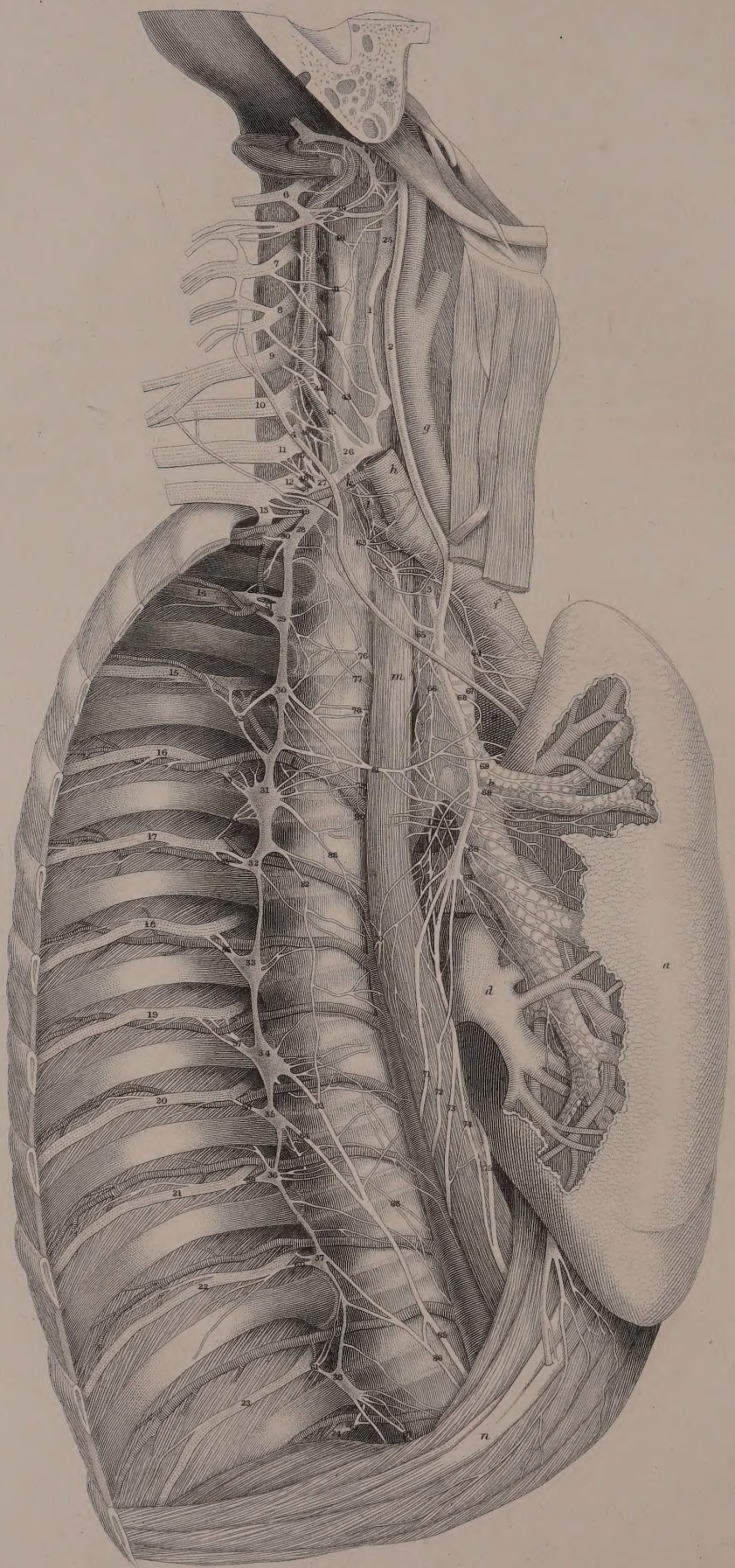
60 The same as 61 P. I.

61 A large branch passing over the subclavian artery from the second to the third cervical ganglion, and is the same as 95 P. IV.

62 Is the same as 96 P. IV.; it communicates with 95 P. IV. and the third cervical ganglion.

63 Proceeds from 48 P. II., and passes underneath the subclavian artery, to join 47 P. II., 64 P. IV., and is the same as 97 P. IV.

64 Proceeds from 48 P. II., and communicates with 65 P. IV., and is the same as 98 P. IV.



Drawn by West.

Engraved by Finden.

PLATE III.

This plate exhibits the nerves on the right side of the thorax. The vertebral artery and the branches of the sympathetic nerve accompanying it have been exposed. The right lung has been turned over to the left side for allowing a view of the posterior pulmonary plexus, the divisions of the par vagum on the œsophagus, and the continuation of the sympathetic nerve through the thorax, as well as its connexion with the dorsal nerves and arteries. The diaphragm has been folded so as to exhibit the branch of the phrenic nerve passing through it to communicate with the hepatic plexus and the right semilunar ganglion.

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a Right lung turned over to the left side.
b Trachea and its divisions in the right lung.
c Pulmonary artery.
d Pulmonary veins.
e Aorta.
f Innominata.
g Carotid artery.
h Subclavian artery drawn aside.
j Vertebral artery.
k Superior intercostal nerve.
l The first of the other intercostal arteries.
m Œsophagus.
n Diaphragm.

1 Prolongation of the sympathetic nerve.
2 Trunk of the par vagum.
3 Recurrent nerve.
4 Phrenic nerve; the branch passing through the diaphragm is seen in 46 P. V.
5 Suboccipital nerve.
6 First cervical nerve.
7 Second cervical nerve.
8 Third cervical nerve.
9 Fourth cervical nerve.
10 Fifth cervical nerve.
11 Sixth cervical nerve.
12 Seventh cervical nerve.
13 First dorsal nerve.
14 Second dorsal nerve.
15 Third dorsal nerve.
16 Fourth dorsal nerve.
17 Fifth dorsal nerve.
18 Sixth dorsal nerve.
19 Seventh dorsal nerve.
20 Eighth dorsal nerve.
21 Ninth dorsal nerve.
22 Tenth dorsal nerve.
23 Eleventh dorsal nerve.
24 Twelfth dorsal nerve.
25 First cervical ganglion of the sympathetic nerve.
26 Second cervical ganglion of the sympathetic nerve.
27 Third cervical ganglion of the sympathetic nerve.
28 First thoracic ganglion of the sympathetic nerve.
29 Second thoracic ganglion of the sympathetic nerve.
30 Third thoracic ganglion of the sympathetic nerve.
31 Fourth thoracic ganglion of the sympathetic nerve.
32 Fifth thoracic ganglion of the sympathetic nerve.
33 Sixth thoracic ganglion of the sympathetic nerve.
34 Seventh thoracic ganglion of the sympathetic nerve.
35 Eighth thoracic ganglion of the sympathetic nerve.
36 Ninth thoracic ganglion of the sympathetic nerve.
37 Tenth thoracic ganglion of the sympathetic nerve.
38 Eleventh thoracic ganglion of the sympathetic nerve.
39 Communication between the first cervical ganglion of the sympathetic nerve, and the first and second cervical nerves.
40. 41. 42. 43 Branches proceeding from the sympathetic to the cervical nerves.
44 The same as 38 P. I.; it passes up with the vertebral artery, and communicates with the branch

46 sent up from the third cervical ganglion, and forms a plexus on the vertebral artery to communicate with the five first cervical and suboccipital nerves.

45 The same as 40 P. I. sent to the fourth cervical nerve from the second cervical ganglion.

46 A branch from 47 to communicate with the plexus on the vertebral artery.

47 Arises from the third cervical ganglion, gives a branch to the sixth cervical nerve, and terminates in 46.

48 Two branches from the third cervical ganglion to join the sixth and seventh cervical nerves.

49 Branches from the third cervical ganglion to join the seventh cervical and first dorsal nerves.

50 Branches from the first thoracic ganglion encircling the superior intercostal artery, and terminating in the first dorsal nerve.

51 Branches from the second thoracic ganglion to the second dorsal nerve.

52 A branch formed by the third thoracic ganglion and its prolongation, and given to the third dorsal nerve.

53 Branches from the fourth thoracic ganglion to the fourth dorsal nerve.

54 A branch from the fourth thoracic ganglion to the fifth dorsal nerve.

55 Branches from the fifth thoracic ganglion to the fifth dorsal nerve.

56 Branches from the sixth thoracic ganglion to the sixth dorsal nerve.

57 Branches from the seventh thoracic ganglion to the seventh dorsal nerve.

58 A branch from the eighth thoracic ganglion to the eighth dorsal nerve.

59 A branch from the ninth thoracic ganglion to the ninth dorsal nerve.

60 Branches from the tenth thoracic ganglion to the tenth dorsal nerve.

61 A branch from the prolongation of the tenth, and another from the eleventh thoracic ganglion to the eleventh dorsal nerve.

62 A branch from the eleventh thoracic ganglion to the twelfth dorsal nerve.

63 Part of the plexus surrounding the subclavian artery and its branches as described in 39 P. I.

64 Branches from the part of the lateral cardiac plexus, 48 P. I.

65 Proceeds from the recurrent to the œsophagus, and is the same as 59 P. I.

66 The same as 44 P. I.; it communicates with the anterior and posterior pulmonary plexuses, and the right trunk of the par vagum, and gives branches to the œsophagus, and terminates in the branches of the right trunk of the par vagum passing on the œsophagus.

67 Arises from the right trunk of the par vagum, and terminates in the anterior pulmonary plexus, 43 P. I.

68 Forms part of the anterior pulmonary plexus, and communicates with the right thoracic plexus, 81 P. III.

69 Branches from the right trunk of the par vagum, forming the posterior pulmonary plexus.

70 Branches from the right trunk of the par vagum, communicating with 80 P. IV. and terminating on the œsophagus.

71. 72. 73 Branches of the right trunk of the par vagum passing behind the œsophagus to join 84. 85. 86 P. IV., to form the right chord as it passes through the diaphragm.

74 A branch from the right trunk of the par vagum, joined to 75 P. III., 82 P. IV. from the left, for constituting the left chord as it passes through the diaphragm.

75 The branch proceeding from the union of the left trunk of the par vagum, 81 and 82 P. IV.

76. 77. 78. 79. 80 The principal part of the right thoracic plexus formed by branches from the third cervical, and the first, second, third, and fourth thoracic ganglia to pass behind the œsophagus, to 72. 73. 74. 75. 76 P. IV.

81 Proceeds from the right thoracic plexus to communicate with the right anterior and posterior pulmonary plexuses, and accompany the divisions of the bronchial artery.

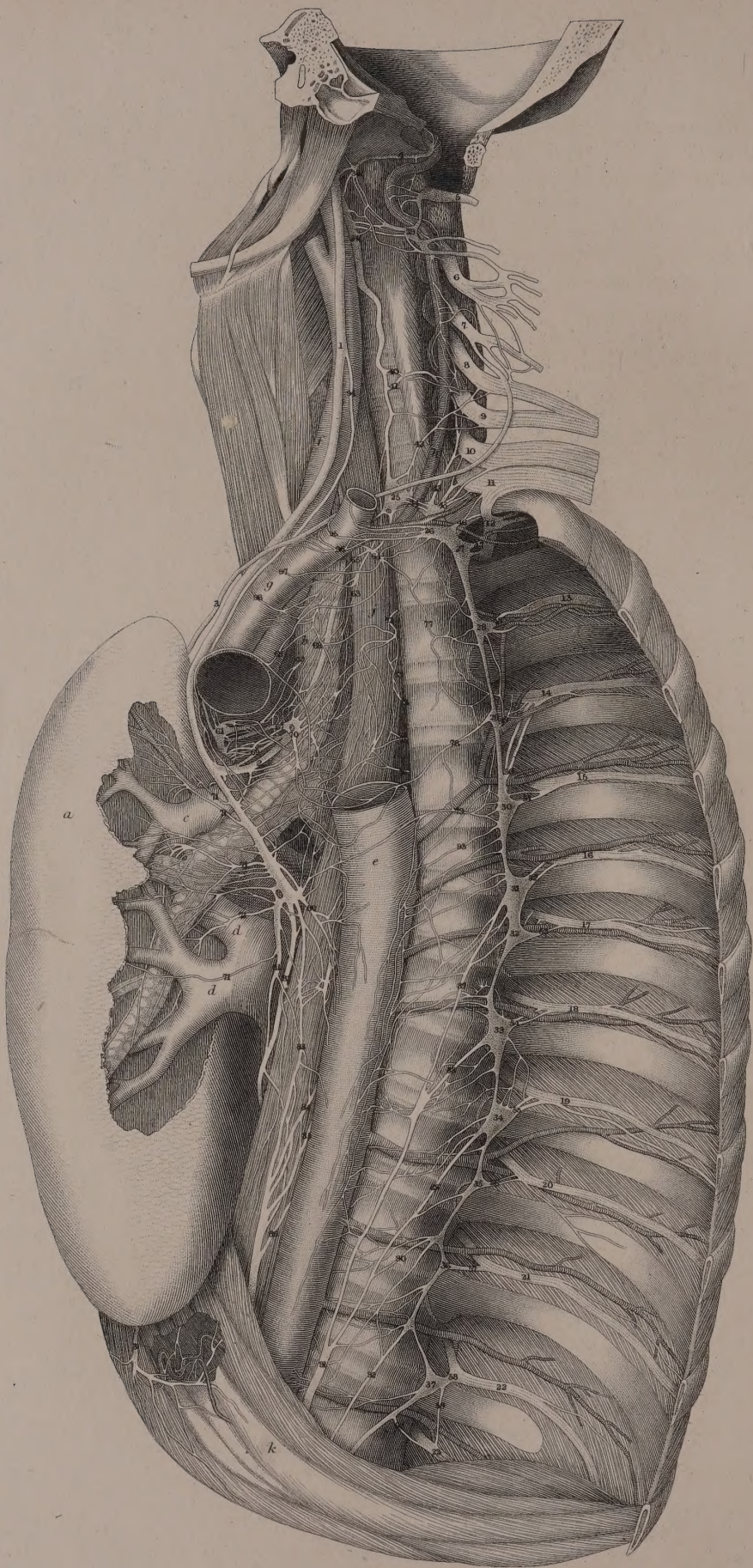
82. 83. 84 Proceed from the fifth, seventh, and eighth thoracic ganglia to form the great splanchnic nerve.

85 The great splanchnic nerve; its continuation is 42 P. V.

86 The lesser splanchnic nerve; it arises from the tenth thoracic ganglion and its prolongation, and terminates in the right emulgent plexus 44 P. V.

87 Proceeds from the eleventh thoracic ganglion, and terminates in the right emulgent plexus 45 P. V.

88 Branches similar to these arise from the sympathetic and the splanchnic nerves, to be distributed on the aorta, the intercostal arteries, the cellular membrane, and ligaments of the spine.



Drawn by West.

Engraved by Finden.

PLATE IV.

This plate exhibits the nerves of the left side of the thorax. The vertebral artery has been more exposed than in the third plate. The lung has been turned over to the right side for the same purpose as in the third plate. The aorta has been divided at its arch for allowing a view of the terminations of the cardiac nerves of the left side and their communications with the thoracic and left posterior pulmonary plexuses.

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a Left lung turned to the right side.
b Trachea and its divisions in the left lung.
c Pulmonary artery.
d Pulmonary veins.
e Aorta divided near the termination of its arch.
f Carotid artery.
g Subclavian artery.
h Vertebral artery.
j Œsophagus.
k Diaphragm.

1 Trunk of the par vagum
2 Recurrent nerve.
3 Phrenic nerve.
4 Suboccipital nerve.
5 First cervical nerve.
6 Second cervical nerve.
7 Third cervical nerve.
8 Fourth cervical nerve.
9 Fifth cervical nerve.
10 Sixth cervical nerve.
11 Seventh cervical nerve.
12 First dorsal nerve.
13 Second dorsal nerve.
14 Third dorsal nerve.
15 Fourth dorsal nerve.
16 Fifth dorsal nerve.
17 Sixth dorsal nerve.
18 Seventh dorsal nerve.
19 Eighth dorsal nerve.
20 Ninth dorsal nerve.
21 Tenth dorsal nerve.
22 Eleventh dorsal nerve.
23 Twelfth dorsal nerve.
24 First cervical ganglion of the sympathetic nerve.
25 Second cervical ganglion of the sympathetic nerve.
26 Third cervical ganglion of the sympathetic nerve.
27 First thoracic ganglion of the sympathetic nerve.
28 Second thoracic ganglion of the sympathetic nerve.
29 Third thoracic ganglion of the sympathetic nerve.
30 Fourth thoracic ganglion of the sympathetic nerve.
31 Fifth thoracic ganglion of the sympathetic nerve.
32 Sixth thoracic ganglion of the sympathetic nerve,
33 Seventh thoracic ganglion of the sympathetic nerve.
34 Eighth thoracic ganglion of the sympathetic nerve.
35 Ninth thoracic ganglion of the sympathetic nerve.
36 Tenth thoracic ganglion of the sympathetic nerve.
37 Eleventh thoracic ganglion of the sympathetic nerve.
38 Communications between the suboccipital, the left trunk of the par vagum, and the first cervical ganglion of the sympathetic, and the first cervical nerve.
39 A communication between the first cervical nerve and the first cervical ganglion and the suboccipital nerve.
40 A branch from the branch of the prolongation 34 P. II. to join a branch of 37 P. II., 42 P. IV.
41 A branch of the prolongation the same as 33 P. II. to join the plexus on the vertebral artery.
42 Arises from the second cervical ganglion, and is

the same as 37 P. II.; the fibres of the anterior scalenus muscle have been removed to show its termination in the fourth and fifth cervical nerves.

43 The same as 38 P. II.; it accompanies the vertebral artery, and forms an extensive communication with the branch 41 P. IV. and the six superior cervical nerves and the suboccipital.

44 Two branches the same as 39 P. II. passing from the second to the third cervical ganglion.

45 Branches passing from the third cervical ganglion to the sixth and seventh cervical nerves.

46 A branch from the third cervical ganglion to the seventh cervical and first dorsal nerves.

47 Branches from the first thoracic ganglion to the first dorsal nerve.

48 Branches from the second thoracic ganglion to the second dorsal nerve.

49 A branch from the third thoracic ganglion communicating with the second thoracic ganglion, and the left thoracic plexus.

50 Two branches from the beginning of the fourth thoracic ganglion to the third dorsal nerve.

51 A branch from the fourth thoracic ganglion to the fourth dorsal nerve.

52 Two branches from the fifth thoracic ganglion to the fifth dorsal nerve.

53 Branches from the sixth thoracic ganglion to the sixth dorsal nerve.

54 Branches from the seventh thoracic ganglion to the seventh dorsal nerve.

55 Branches from the eighth thoracic ganglion to the eighth dorsal nerve.

56 Branches from the ninth thoracic ganglion to the ninth dorsal nerve.

57 A branch from the tenth thoracic ganglion to the tenth dorsal nerve.

58 A thick branch from the eleventh thoracic ganglion to the eleventh dorsal nerve.

59 A branch from the eleventh thoracic ganglion to the twelfth dorsal nerve.

60 A branch from the prolongation of the sympathetic to the twelfth dorsal nerve.

61 The ventricular plexus, the same as 41 P. I. and 40 P. II.

62 The same as 53 P. I. and 45 P. II.

63 The same as 46 P. II.

64 The same gangliform enlargement as 47 P. II.

65 Is the principal continuation of 47 P. II. and 64 P. IV.

66 Proceeds from 65 P. IV., part of it, 57 P. II., passes in front of the aorta, gives a branch to the recurrent, and then passes to the posterior pulmonary plexus, the other part, 58 P. II., terminates in 70 P. IV.

67 The same as 54 P. I.; it joins 70 P. IV.

68 A branch of the recurrent terminating in the auricular plexus, the same as 52 P. I.

69 A branch of the recurrent the same as 56 P. II.; it sends a branch upwards to join 70 P. IV., and another downwards to give filaments to the pulmonary artery and auricular plexus, and then rejoins the recurrent.

70 Forms a communication between the left trunk of the par vagum and recurrent, the ventricular, the auricular, and the right and left thoracic plexuses.

71 Branches forming the left posterior pulmonary plexus.

72. 73. 74. 75. 76 The same as 76. 77. 78. 79. 80 P. III. to communicate with the left thoracic, the left lateral cardiac, the left posterior pulmonary and the ventricular plexuses.

77. 78. 79 The left thoracic plexus formed by branches from the gangliform enlargement 47 P. II., 64 P. IV. and branches from the first, second, third, and fourth thoracic ganglia.

80 Arises from the left trunk of the par vagum, gives filaments to the aorta and œsophagus, and communicates with the branches of the right trunk of the par vagum 70. 70 P. III.

81 Arises from the left trunk of the par vagum, gives branches to the œsophagus, and joins another branch of the same nerve, 82 P. IV.

82 The branch of the left trunk of the par vagum united to the branch 81 P. IV.; it passes over the œsophagus and joins a branch of the right trunk of the par vagum 74 P. III. to form the left chord as it passes through the diaphragm.

83 A branch of the left trunk of the par vagum to join a branch from the right side, 71 P. III. 84 P. IV.

84. 85. 86 Are the continuation of the right trunk of the par vagum, 71. 72. 73 P. III., and form the right chord as it passes through the diaphragm.

87 A branch arising from the fifth and sixth thoracic ganglia to unite with the branch 88 P. IV., and terminate in the great splanchnic nerve.

88 Arises from the seventh thoracic ganglion, and is united to the branch 87 P. IV. to terminate in the great splanchnic nerve.

89 Arises from the eighth thoracic ganglion, receives one branch from the ninth and another from its

prolongation, and terminates in the great splanchnic nerve.

90 Arises from the prolongation just above the tenth thoracic ganglion, it joins the branch 89 P. IV., and terminates in the great splanchnic nerve.

91 The great splanchnic nerve; its continuation is seen 38 P. VI.

92 The lesser splanchnic nerve; its continuation is seen 40 P. VI.

93 Branches similar to these arise from the thoracic ganglia and the prolongation, and the branches forming the splanchnic nerves, and constitute a plexus to terminate on the aorta, the intercostal arteries, the cellular membrane, and ligaments of the spine.

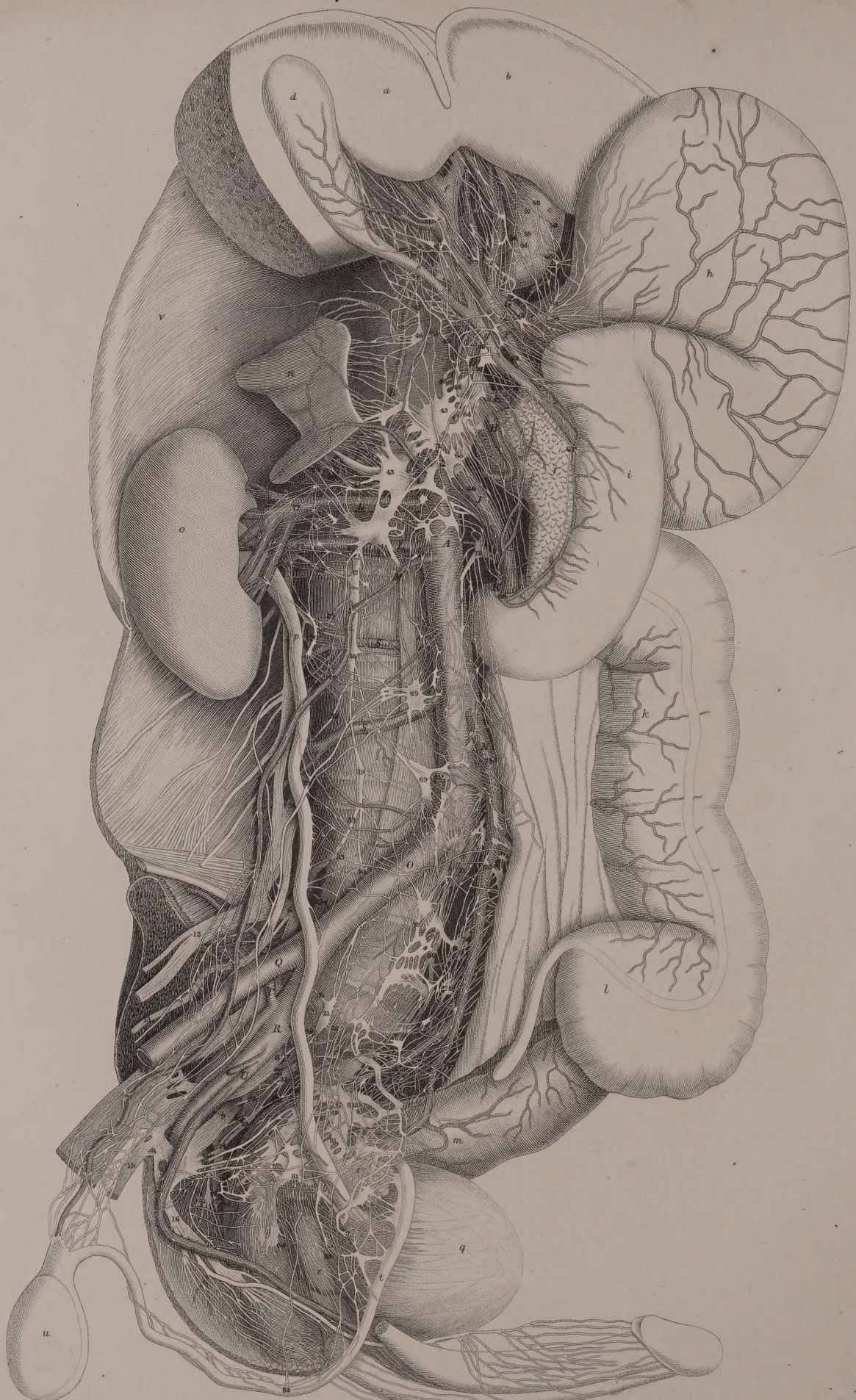
94 The branch of the left trunk of the par vagum the same as 43 P. II., to terminate in the ventricular plexus.

95 The branch passing over the subclavian artery from the second to the third cervical ganglion, and is the same as 61 P. II.

96 Arises from the gangliform enlargement 48 P. II., and is the same as 62 P. II., it communicates with 95 P. IV. and the third cervical ganglion.

97 Arises from the gangliform enlargement 48 P. II., and passes underneath the subclavian artery to join the gangliform enlargement 47 P. II., 64 P. IV., and is the same as 63 P. II.

98 Proceeds from the gangliform enlargement 48 P. II.; it communicates with the branch 65 P. IV. and is the same as 64 P. II.



Drawn by West.

Engraved by Finden.

PLATE V.

THIS plate exhibits the lumbar and sacral portions of the sympathetic nerve of the right side, and their connexions with the nerves of the abdominal viscera. The greatest portion of the ribs, the bones of the pelvis, and the abdominal and psoas muscles have been removed; the diaphragm has been folded over the cut ends of the ribs; a portion of the large lobe of the liver has been cut away; the great curvature of the stomach, and the duodenum have been turned to the left side, so as to show the inferior part of the hepatic artery, its right branch, the part of the right hepatic plexus connected with these, and the nerves accompanying the arteries of the duodenum; the left branch of the hepatic artery remains in the same position as in Plate VII., and by drawing down the œsophagus and raising the stomach, much of the connexion of the branches of the right with those of the left hepatic plexus have been exposed as in Plate VII.; the right portion of the colon has been turned over to the left side, and the rectum and bladder placed so as to allow room for exhibiting the sacral portions of the sympathetic nerve.

A Aorta.
B Phrenic artery.
C Cœliac artery.
D Hepatic artery and its right and left branches.
E Splenic artery.
F Right inferior gastric artery.
G Pyloric artery.
H Pancreatic artery.
J Superior mesenteric artery.
K Branch of the superior mesenteric artery to meet one from the right inferior gastric to be given to the duodenum
L Emulgent arteries.
M Spermatic artery.
N Inferior mesenteric artery.
O Right common iliac artery.
P Left common iliac artery.
Q External iliac artery.
R Internal iliac artery.
S Lumbar arteries.
T Ilio-lumbar artery.
U Internal pudendal artery.

a Right lobe of the liver.
b Left lobe of the liver.
c Lobe of Spigelius.
d Gall bladder.
e Cystic duct.
f Hepatic duct.
g Common gall duct.
h Stomach.
i Duodenum.
j Pancreas.
k Ascending portion of the colon.
l Cœcum.
m Left side of the colon terminating in the rectum.
n Renal capsule.
o Right kidney.
p Ureter.
q Bladder.
r Prostate gland.
s Vesicula seminalis.
t Vas deferens.
u Testis.
v Diaphragm.

1 Left or anterior trunk of the par vagum.
2 Prolongation of the sympathetic nerve.
3 First lumbar nerve
4 Second lumbar nerve.
5 Third lumbar nerve.
6 Fourth lumbar nerve.
7 Fifth lumbar nerve.
8 First sacral nerve.
9 Second sacral nerve.
10 Third sacral nerve.
11 Fourth sacral nerve.
12 Anterior crural nerve.
13 Obturator nerve.
14 Sciatic nerve.
15 Gluteal nerve.
16 Internal pudendal nerve.
17 First lumbar ganglion of the sympathetic nerve.
18 Second lumbar ganglion of the sympathetic nerve.
19 Third lumbar ganglion of the sympathetic nerve.
20 Fourth lumbar ganglion of the sympathetic nerve.
21 First sacral ganglion of the sympathetic nerve.
22 Second sacral ganglion of the sympathetic nerve.
23 Third sacral ganglion of the sympathetic nerve.
24 Fourth sacral ganglion of the sympathetic nerve.
25 Fifth sacral ganglion of the sympathetic nerve.
26 A branch from the prolongation to the twelfth dorsal nerve.
27 A branch from the first lumbar ganglion to the twelfth dorsal nerve.
28 A branch from the first lumbar ganglion to the first lumbar nerve.
29 A branch from the first lumbar ganglion to the second lumbar nerve.
30 A branch from the second lumbar ganglion to divide into two, one of these to divide again before uniting with the junction between the first and second lumbar nerves, and the other to join the second lumbar nerve.
31 A branch from the second lumbar ganglion to the second lumbar nerve.
32 A branch from the second lumbar ganglion to the third lumbar nerve.
33 A branch from the third lumbar ganglion to the fourth lumbar nerve.
34 A branch from the fourth lumbar ganglion to the fourth lumbar nerve ; it communicates with one of the branches of another branch from the same ganglion going to the fifth lumbar nerve, but is hidden by the iliac artery.
35 A branch from the first sacral ganglion to the fifth lumbar nerve.
36 A branch from the first sacral ganglion to the first sacral nerve.
37 A branch from the second sacral ganglion to the first sacral nerve.
38 A branch from the second sacral ganglion to the second sacral nerve.
39 A branch from the third sacral ganglion to the second sacral nerve.
40 A branch from the fourth sacral ganglion to the third sacral nerve.
41 A branch from the fifth sacral ganglion to the fourth sacral nerve.
42 Great splanchnic nerve.
43 Semilunar ganglion.
44 Termination of the lesser splanchnic nerve.
45 The branch 87 P. III. from the eleventh thoracic ganglion to the emulgent plexus.
46 A ganglion communicating with the phrenic nerve, and giving filaments to the renal capsule and diaphragm, and sending a branch 53 P. V., 4 P. VII. to join the left hepatic plexus, and give filaments to the inferior cava and the parts surrounding it.
47 The branch of the right phrenic nerve to join the ganglion 46 P. V.
48 Branches forming the principal part of the origin of the right hepatic plexus seen at the right side of the hepatic artery, but communicating freely at their origin with the cœliac plexus 17 P. VII., and in their course with part of the right hepatic plexus 19 P. VII.
49. Branches of the right hepatic plexus seen at the right and posterior part of the hepatic artery.
50 Branches the same as 24 P. VII. from the right hepatic plexus to the gall bladder.
51 Branches of the right hepatic plexus the same as 23 P. VII.
52 Branches of the right hepatic plexus, the same as those proceeding from 19 P. VII., to accompany the left branch of the hepatic artery.
53 The branch from the ganglion 46 P. V. to 4 P. VII., to join the left hepatic plexus.
54 A branch of the left hepatic plexus the same as 5 P. VII.
55 A branch of the left hepatic plexus the same as 6 P. VII.
56 A branch of the left hepatic plexus the same as 7 P. VII.
57 A branch of the left hepatic plexus the same as 8 P. VII.
58 A branch of the left hepatic plexus the same as 9 P. VII.

59 A branch of the left hepatic plexus the same as 10 P. VII.

60 The junction of 63. 64 P. VI., 11. 12 P. VII., to the left hepatic plexus.

61 Branches from the right hepatic plexus accompanying the pyloric artery, and communicating with those seen in 21 P. VII.

62 Branches from the right hepatic plexus accompanying the right inferior gastric artery, and forming junctions with those seen in 20 P. VII.

63 Branches passing on the anterior part of the splenic artery, and joining those seen in 45 P. VI.

64 Part of the membranous sheath surrounding the cœliac artery, and forming the cœliac plexus.

65 Part of the membranous sheath surrounding the superior mesenteric artery, and forming the beginning of the superior mesenteric plexus.

66 Branches of the superior mesenteric plexus ; their continuation is seen in 4 P. VIII.

67 Branches from the right hepatic plexus to accompany a branch of the right inferior gastric artery, and unite with a branch 68 P. V. of the superior mesenteric plexus on a branch of the superior mesenteric artery.

68 A branch of the superior mesenteric plexus to the duodenum to unite with 67 P. V.

69 Portions of the right side of the aortic plexus.

70 A communication between the aortic, the right emulgent, and spermatic plexuses.

71 A nerve connecting the right hepatic plexus with the nerves of the renal capsules, the right semilunar ganglion, and the aortic plexus.

72 Part of the aortic plexus the same as 51 P. VI., 2 P. VIII. ; the branches proceeding from it form communications with each spermatic plexus, and other branches of the aortic plexus, with the inferior mesenteric plexus, and some of them terminate on the mesocolon.

73 Inferior mesenteric plexus, the same as 54 P. VI.

74 Portions of the inferior mesenteric plexus, the same as 55. 55 P. VI., communicating with the aortic, and the hypogastric plexus of each side.

75 Branches of the inferior mesenteric plexus, seen more particularly on the right side of the inferior mesenteric artery.

76 Branches from the semilunar ganglion to the renal capsule.

77 Right emulgent plexus.

78 Right spermatic plexus.

79 Right hypogastric plexus.

80 Left hypogastric plexus.

81 Junctions of the right hypogastric plexus with branches of the third and fourth sacral nerves to terminate on the rectum, bladder, ureter, vesicula seminalis, vas deferens, and prostate gland.

82 Branches from the right hypogastric plexus, to accompany the vas deferens to join the spermatic plexus.

83 Branches of the aortic plexus to the ureter.

84 Branches to the bladder, rectum, &c., from the junction 81 P. V. of the right hypogastric plexus with the third and fourth sacral nerves.

85 Branches from the right hypogastric plexus, their connexion with those of the left is seen in 56 P. VI.

86 A branch from the third sacral nerve to the plexus 81 P. V.

87 A branch from the fourth sacral nerve to the plexus 81 P. V.

88 Branches from the first sacral ganglion to the ligaments of the sacrum.

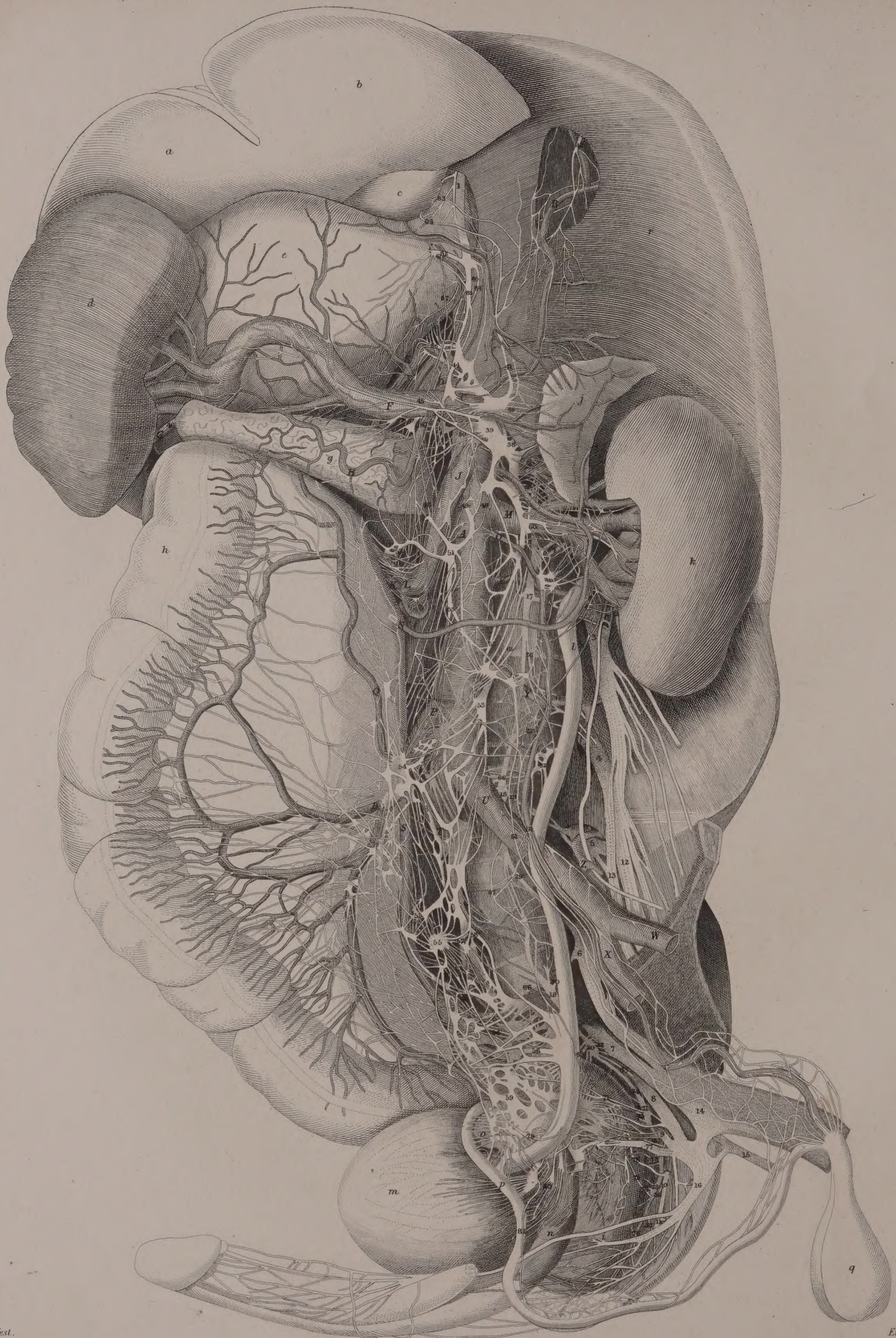
89 A branch from the second and third sacral ganglia to the hypogastric plexus.

90 A branch from the fourth sacral ganglion to join a branch of the third sacral nerve given to the hypogastric plexus.

91 A branch from the fourth sacral ganglion to join the fourth sacral ganglion of the left side.

92 A branch from the fifth sacral ganglion to join a branch from the fifth sacral ganglion of the left side.

93 The branches of the left or anterior trunk of the par vagum the same as 2. 3 P. VII.



Drawn by West.

Engraved by Finden.

PLATE VI.

THIS plate exhibits the lumbar and sacral portions of the sympathetic nerve of the left side, and their connexions with the nerves of the abdominal viscera. The greatest portion of the ribs, the bones of the pelvis, and the abdominal and psoas muscles, have been removed: the diaphragm has been folded over the extremities of the ribs; the liver has been placed as much as possible on the right side; the broad end of the stomach has been turned to the right side, for the purpose of exhibiting the right or posterior trunk of the par vagum; the spleen and the left portion of the colon have been also turned to the right side; the bladder and rectum have been placed so as to allow room for exhibiting the sacral portion of the sympathetic nerve.

A Aorta
B Phrenic artery.
C Cœliac artery.
D Superior gastric or coronary artery.
E Hepatic artery.
F Splenic artery.
G Left inferior gastric artery.
H Pancreatic artery.
J Superior mesenteric artery.
K The two first branches of the superior mesenteric artery *B. B.* P. VIII.
L A branch of the superior mesenteric artery to the duodenum the same as *K.* P. V.
M Left emulgent artery.
N A branch of the left emulgent artery to the meso-colon.
O Left spermatic artery.
P Inferior mesenteric artery.
Q Ascending branch of the inferior mesenteric artery.
R Left colic branch of the inferior mesenteric artery.
S Internal hæmorrhoidal artery.
T Right common iliac artery.
U Left common iliac artery.
W External iliac artery.
X Internal iliac artery.
Y Lumbar arteries.
Z Ilio-lumbar artery.

a Right lobe of the liver.
b Left lobe of the liver.
c Lobe of Spigelius.
d Posterior surface of the spleen.
e Posterior surface of the stomach.
f Duodenum.
g Pancreas.
h Descending portion of the colon.
i Rectum.
j Left renal capsule.
k Kidney.
l Ureter.
m Bladder.
n Prostate gland.
o Vesicula seminalis.
p Vas deferens.
q Testis.
r Diaphragm.

1 Right or posterior trunk of the par vagum.
2 A branch of the first lumbar nerve.
3 Second lumbar nerve.
4 Third lumbar nerve.
5 Fourth lumbar nerve.
6 Fifth lumbar nerve.
7 First sacral nerve.
8 Second sacral nerve.

9 Third sacral nerve.
10 Fourth sacral nerve.
11 Fifth sacral nerve
12 Anterior crural nerve.
13 Obturator nerve.
14 Sciatic nerve.
15 Gluteal nerve.
16 Internal pudendal nerve.
17 First lumbar ganglion of the sympathetic nerve.
18 Second lumbar ganglion of the sympathetic nerve.
19 First sacral ganglion of the sympathetic nerve.
20 Second sacral ganglion of the sympathetic nerve.
21 Third sacral ganglion of the sympathetic nerve.
22 Fourth sacral ganglion of the sympathetic nerve.
23 Fifth sacral ganglion of the sympathetic nerve.
24 Two branches from the first lumbar ganglion of the sympathetic to the twelfth dorsal nerve.
25 A branch from the first lumbar ganglion to divide and send one branch to the first, the other to the second lumbar nerve.
26 A branch from the first lumbar ganglion to the third lumbar nerve.
27 A branch from the prolongation to the third lumbar nerve.
28 A branch from the second lumbar ganglion to the fourth lumbar nerve.
29 A branch from the second lumbar ganglion to the fifth lumbar nerve.
30 A branch from the first sacral ganglion to the fifth lumbar nerve.
31 A branch from the first sacral ganglion to the first sacral nerve.
32 Branches from the second sacral ganglion to the first sacral nerve.
33 A branch from the second sacral ganglion to the second sacral nerve.
34 A branch from the third sacral ganglion to the second sacral nerve.
35 Two branches from the fourth sacral ganglion to the third sacral nerve.
36 A branch from the fifth sacral ganglion to the fourth sacral nerve.
37 A branch from the prolongation to the fifth sacral nerve.
38 Great splanchnic nerve.
39 Semilunar ganglion.
40 Lesser splanchnic nerve.
41 A branch of the semilunar ganglion to give filaments to the renal capsule, communicate with other filaments of the semilunar ganglion sent on the phrenic artery to join the phrenic nerve, and send two branches across the cardiac termination of the œsophagus 63. 64 P. VI., 11. 12 P. VII.
42 A branch of the left phrenic nerve to give branches to the diaphragm, and communicate with filaments from the branch 41 P. VI. from the left semilunar ganglion.
43 Branches from the semilunar ganglion to the renal capsule.
44 Part of the cœliac plexus connected with the right or posterior trunk of the par vagum and the left semilunar ganglion.
45 A plexus principally from the left semilunar ganglion to the spleen; some filaments are sent from it with the pancreatic artery to the pancreas, and one with the left inferior gastric artery to the inferior part of the broad end of the stomach.
46 A branch from the plexus on the splenic artery accompanying the left inferior gastric artery to the stomach.
47 Branches from the plexus on the splenic artery accompanying the pancreatic artery.
48 Branches the same as 6 P. VIII. from the cœliac plexus near the beginning of the splenic and pancreatic arteries to join the aortic plexus.
49 Branches from the left semilunar ganglion to the aortic plexus, the same as 1. P. VIII.
50 Branches the same as 5 P. VIII., more particularly from that part of the cœliac plexus 44 P. VI. in which the right or posterior trunk of the par vagum terminates, to the superior mesenteric plexus.
51 Part of the aortic plexus the same as 72 P. V., 2 P. VIII.
52 Part of the aortic plexus the same as 3 P. VIII.
53 Portions of the left side of the aortic plexus.
54 Inferior mesenteric plexus accompanying the branches of the inferior mesenteric artery and communicating with other branches of the aortic and hypogastric plexuses.
55 Portions of the inferior mesenteric plexus the same as 74, P. V.
56 Branches from the inferior mesenteric and hypogastric plexuses to the rectum, their connexion with the right hypogastric plexus is seen in 85 P. V.
57 Right hypogastric plexus.
58 Left hypogastric plexus.
59 The junction of the left hypogastric plexus with branches of the third and fourth sacral nerves, sending off branches to terminate on the ureter, the bladder, the vesicula seminalis, the vas deferens, the prostate gland, and rectum.

60 Left emulgent plexus.

61 Left spermatic plexus.

62 Branches from the aortic plexus to the ureter.

63. 64 Branches from the branch of the left semilunar ganglion 41 P. VI. to part of the left hepatic plexus, the same as 11. 12 P. VII.

65 Two branches from the first lumbar ganglion to the aortic plexus.

66 Branches from the second lumbar ganglion passing behind the iliac artery to the aortic plexus.

67 A branch from the second lumbar ganglion to the ureter.

68 Branches from the first sacral ganglion to the cellular membrane and ligaments of the spine.

69 Branches from the second sacral ganglion to the ligaments, &c., of the sacrum.

70 A branch from the prolongation below the second sacral ganglion to the ligaments, &c., of the sacrum.

71 A branch from the third sacral ganglion to the hypogastric plexus.

72 Branches from the third sacral ganglion to the ligaments, &c., of the sacrum.

73 Branches from the fourth sacral ganglion, one to pass across and communicate with the fourth sacral ganglion of the right ride, the others to be distributed to the ligaments, &c., of the sacrum.

74 Branches from the fifth sacral ganglion, one to pass across to the fifth sacral ganglion of the right side, the other to be distributed to the ligaments, &c., of the sacrum.

75 A branch from the fifth sacral ganglion to the hypogastric plexus.

76 The single ganglion communicating with a plexus from the fourth, fifth, and sixth sacral nerves, and the plexus at the posterior part of the sacrum formed by the posterior branches of the sacral nerves.

77 A branch of the third sacral nerve to the junction 59 P. VI. with the hypogastric plexus to be distributed on the bladder, rectum, &c.

78 A branch from the fourth sacral nerve to the junction 59 P. VI. with the hypogastric plexus.

79 Branches from the hypogastric plexus to the ureter.

80 Branches from the junction 59 P. VI. of the hypogastric plexus with the third and fourth sacral nerves, to be given to the ureter, bladder, vesicula seminalis, vas deferens, prostate gland, and rectum.

81 Branches from the hypogastric plexus to accompany the vas deferens, and communicate with the spermatic plexus.

82 A branch of the right or posterior trunk of the par vagum to the posterior surface of the stomach.

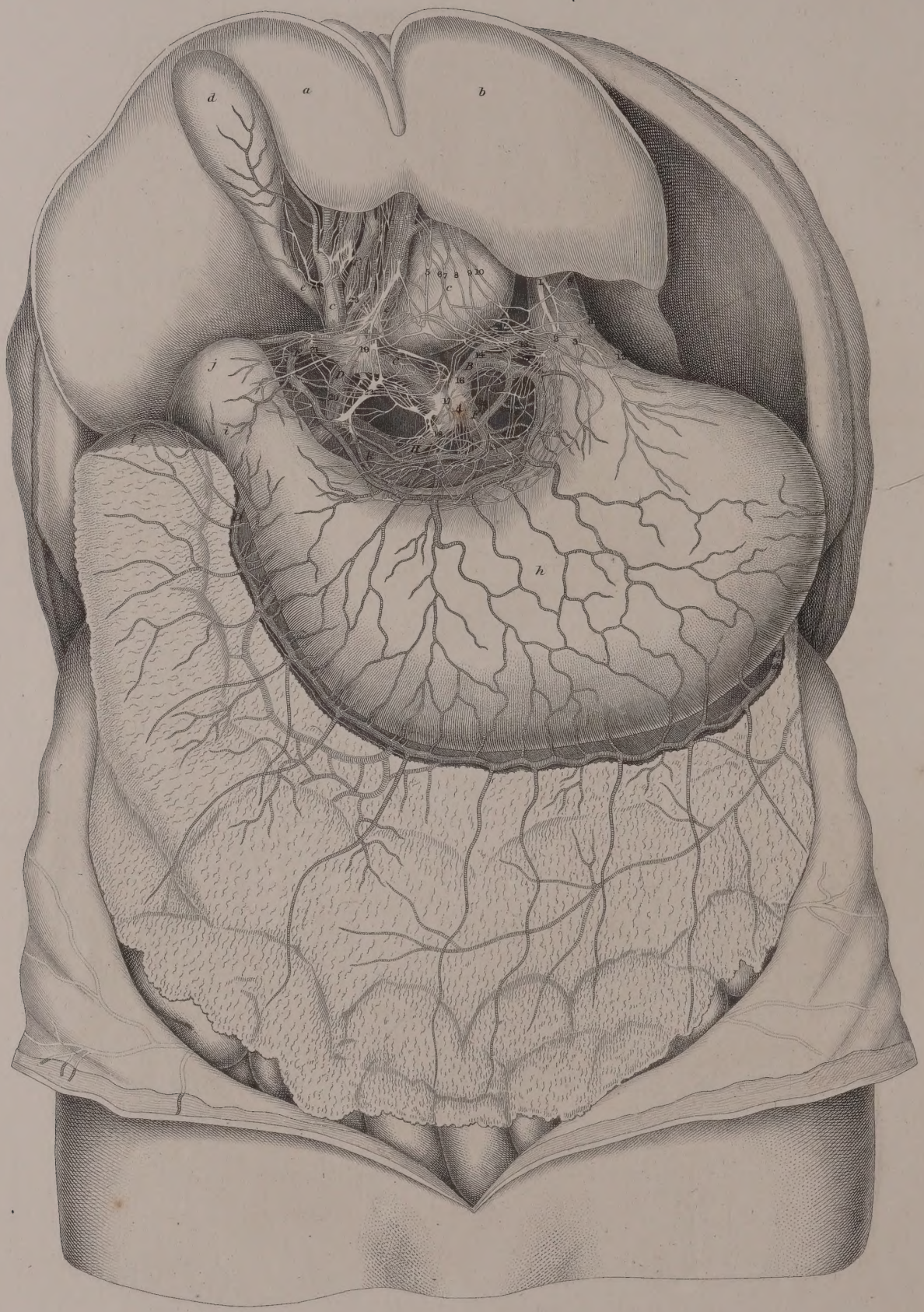
83 The continuation of the right or posterior trunk of the par vagum, the same as 13 P. VII., to communicate with that part of the cœliac plexus connected with the left semilunar ganglion.

84 The branch of the right or posterior trunk of the par vagum : its termination is seen in 14 P. VII.

85 The branch of the right or posterior trunk of the par vagum, the same as 15 P. VII.

86 Branches from the termination 83 P. VI. of the right or posterior trunk of the par vagum at the cœliac plexus, to communicate with the branches of 16 P. VII. on the superior gastric or coronary artery.

87 A branch of the right or posterior trunk of the par vagum to the splenic plexus, the same as 26 P. VII.



Drawn by West.

Engraved by Finden.

PLATE VII.

THE depth of the superior part of the abdomen has been lessened by removing a portion of the sternum and the ends of the ribs, and then placing the diaphragm over the divided parts; the inferior margin of the liver has been raised for the purpose of exhibiting the branches of the left or anterior trunk of the par vagum, the left hepatic plexus, and the portions of the cœliac and right hepatic plexuses on the anterior part of the cœliac and hepatic arteries.

A Cœliac artery.
B Superior gastric or coronary artery.
C Hepatic artery and its right and left branches.
D Right inferior gastric artery.
E Pyloric artery.
F Splenic artery.
G Left inferior gastric artery.
H Pancreatic artery.

a Right lobe of the liver.
b Left lobe of the liver.
c Lobe of Spigelius.
d Gall bladder.
e Cystic duct.
f Hepatic duct.
g Œsophagus.
h Stomach.
i Pylorus.
j Duodenum.
k Pancreas.
l Colon.

1 The left, or anterior trunk of the par vagum; the continuation of 2 P. III.

2. 3 Branches of the left or anterior trunk of the par vagum, sending filaments to the stomach and the left hepatic plexus, and others on the superior gastric artery, to join branches from the part of the right hepatic plexus 21 P. VII. accompanying the pyloric artery.

4 A branch, the same as 53 P. V. proceeding from the ganglion 46 P. V. formed by a branch from the right phrenic nerve, and the right semilunar ganglion, to give filaments to the outside of the inferior cava, and terminate in the left hepatic plexus.

5. 6. 7. 8. 9. 10 The left hepatic plexus, formed by branches from the left, or anterior trunk of the par vagum, communicating with the branches 11. 12 P. VII., and with the branch 53 P. V., 4 P. VII., and the right hepatic plexus; these then pass to the porta of the liver, to accompany the branches of the hepatic artery and vein of the porta, and ramify on them in the substance of the liver.

11. 12 The same as 63. 64 P. VI.; these arise from the branch 41 P. VI. from the left semilunar ganglion, and communicate with the left phrenic nerve on the left phrenic artery, and then pass across the cardiac termination of the œsophagus, to join the left hepatic plexus.

13 The continuation of the right, or posterior trunk of the par vagum, the same as 83 P. VI., to pass behind the origin of the superior gastric artery, and terminate in the cœliac plexus and the left semilunar ganglion 44 P. VI.

14 A branch from the right, or posterior trunk of the par vagum, the same as 84 P. VI., to communicate with the branches of the left or anterior trunk of the par vagum on the superior gastric artery, and others from the part of the right

hepatic plexus 21 P. VII. on the pyloric artery, to terminate on the stomach.

15 Another branch from the right or posterior trunk of the par vagum, the same as 85 P. VI., and terminating on the stomach.

16 Branches accompanying the superior gastric artery, and derived from the cœliac plexus 17 P. VII., and communicating with branches 86 P. VI. from the termination of the right or posterior trunk of the par vagum at the cœliac plexus.

17 Part of the cœliac plexus situated on the cœliac artery, having the appearance of a membranous expansion, and derived from the semilunar ganglion and the termination of the right or posterior trunk of the par vagum.

18 Branches given to the pancreas from the cœliac plexus.

19 Part of the right hepatic plexus situated on the anterior part of the hepatic artery, and having the appearance of a membranous expansion; it is derived principally from the right semilunar ganglion.

20 Branches from the right hepatic plexus 19 P. VII., and 22 P. VII., to pass with the right inferior gastric artery to the stomach.

21 Branches from the right hepatic plexus 19 P. VII., to communicate with others 61 P. V. and pass on the pyloric artery to the stomach, and communicate with part of the right hepatic plexus 22 P. VII., and with the branch of the right or posterior trunk of the par vagum 14 P. VII., and a branch of the left or anterior trunk of the par vagum 2 P. VII.

22 Part of the right hepatic plexus sending branches on the branches of the pyloric artery to communicate with others from the left or anterior trunk of the par vagum 2 P. VII., and sending some upwards to communicate with the left hepatic plexus, and then accompanying the left branch of the hepatic artery to terminate in the liver.

23 Branches of the right hepatic plexus the same as 51 P. V. to accompany more particularly the right branch of the hepatic artery to terminate in the liver.

24 Branches from the right hepatic plexus given to the gall bladder, the same as 50 P. V.

25 A branch from the plexus accompanying the splenic artery, and passing with the left inferior gastric artery to the stomach.

26 A branch of the right or posterior trunk of the par vagum to the splenic plexus, the same as 87 P. VI.

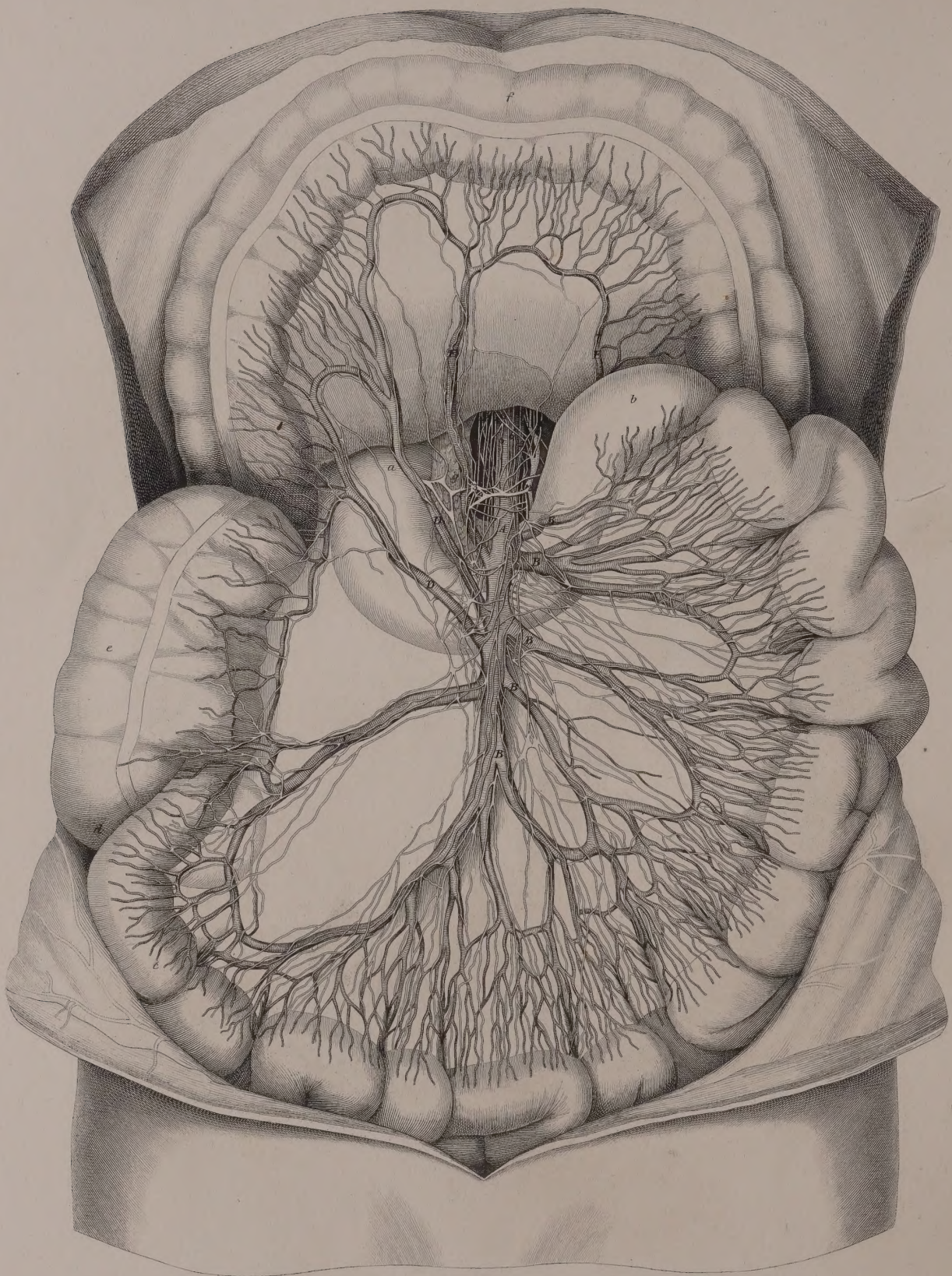

f
b
a
B
B
B

PLATE VIII.

This plate exhibits the nerves accompanying the superior mesenteric artery; the arch of the colon has been turned upwards so as to rest on the margin of the chest.

A Superior mesenteric artery.
B Branches of the superior mesenteric artery given to the small intestines.
C Ilio-colic artery.
D Right colic artery.
E Middle colic artery.
F Ascending branch of the inferior mesenteric artery.

a Duodenum.
b Jejunum.
c Ilium.
d Cœcum.
e Colon.
f Arch of the colon turned upwards.
g Pancreas.

1. 1 Branches the same as 49. 49 P. VI. from the left semilunar ganglion to the part of the aortic plexus 2 P. VIII.
2 Part of the aortic plexus, the same as 72 P. V., 51 P. VI.
3 Part of the aortic plexus, the same as 52 P. VI.; it forms communications with the other nerves of the superior mesenteric plexus; some of its branches accompany the middle colic artery to the colon, and unite with the branch 7 P. VIII. of the inferior mesenteric plexus passing along the ascending branches of the inferior mesenteric artery; others accompany the middle colic artery, the right colic, and part of the ilio-colic.
4 Part of the superior mesenteric plexus, the same as 66 P. V., connected more particularly with the right semilunar ganglion, and forming a plexus with branches from the left side 5 P. VIII. on the superior mesenteric artery, and communicating with others proceeding from the part of the aortic plexus 3 P. VIII., and following the branches *B. B.* P. VIII. of the superior mesenteric artery and part of the ilio-colic *C.* P. VIII. to the small intestines.
5 Branches, more particularly from the left side, near the communication of the branch of the right or posterior trunk of the par vagum 50 P. VI. with the cœliac plexus, to form the superior mesenteric plexus with 4 P. VIII., and communicate with branches from the portions of the aortic plexus 2. 3 P. VIII.
6 Branches the same as 48 P. VI., from the cœliac plexus near the beginning of the splenic and pancreatic arteries to join the aortic plexus.
7 A branch of the inferior mesenteric plexus, to unite with a branch of the aortic plexus 3 P. VIII. accompanying the middle colic artery.

Fig. 3.

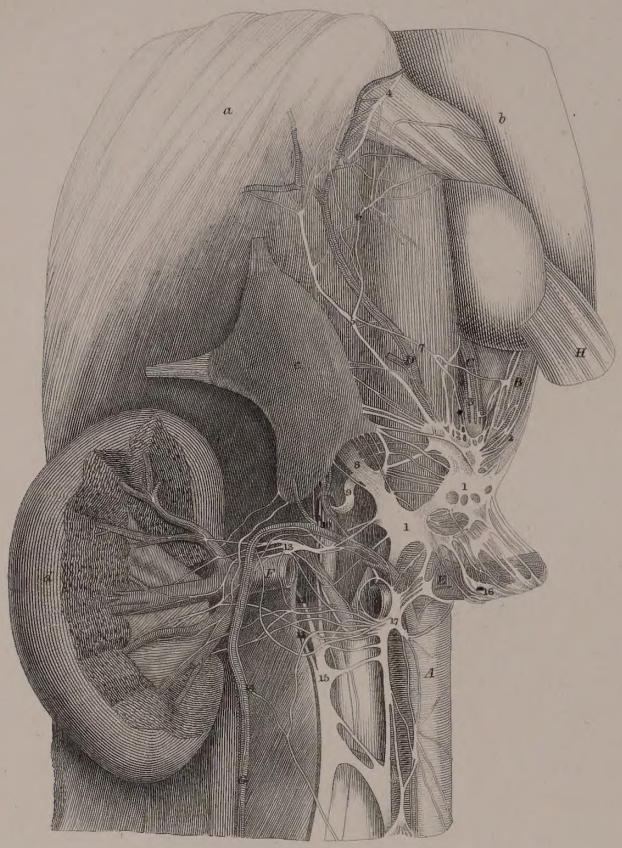


Fig. 1.

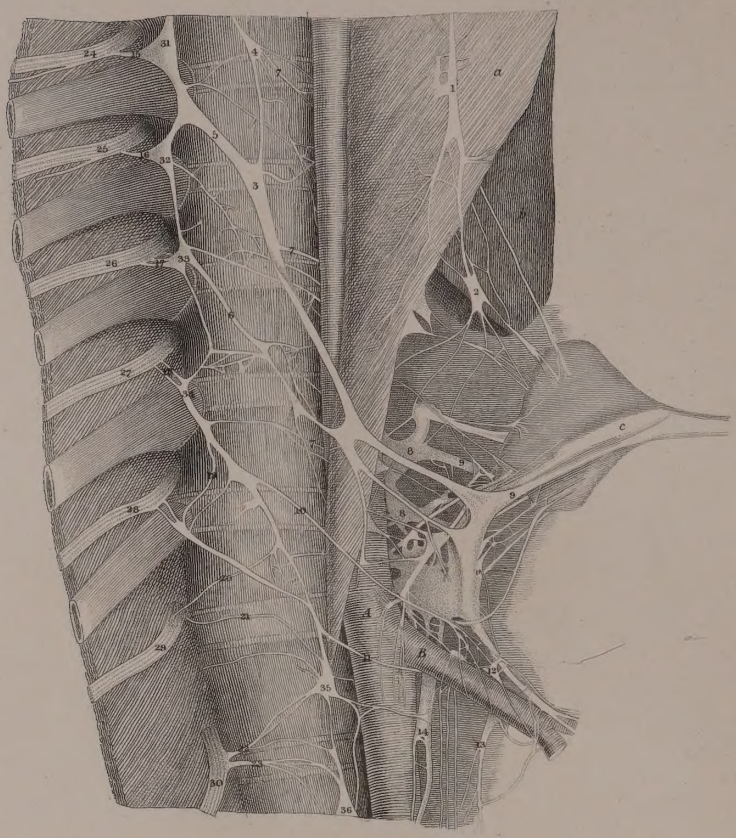


Fig. 4.

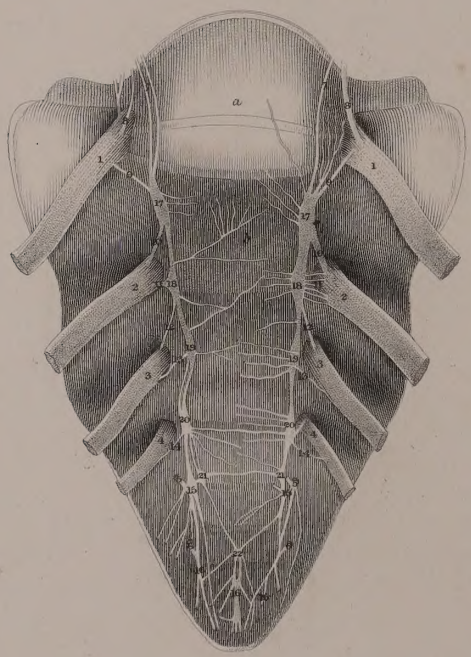
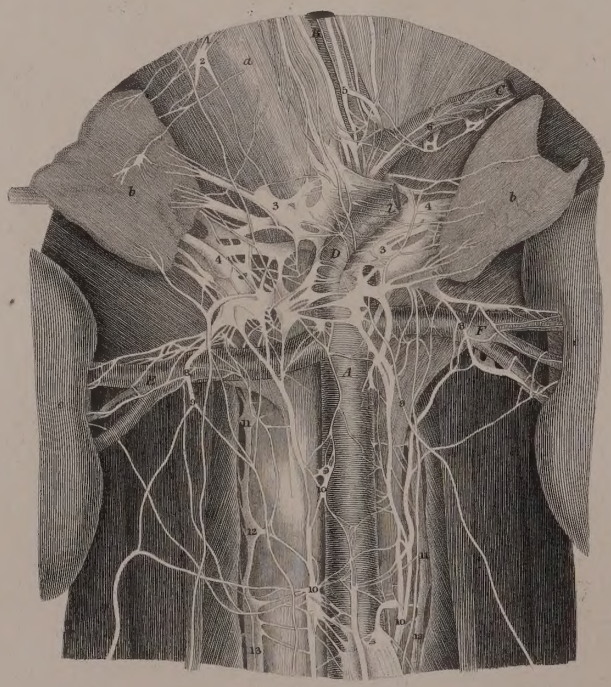


Fig. 2.



Drawn by West.

Engraved by Finden.

PLATE IX.

FIGURE I.

In this figure the diaphragm has been separated and turned aside for the purpose of showing the continuation of the sympathetic nerve, and the greater and lesser splanchnic nerves from the chest to the abdomen. The renal capsule has been also turned aside for affording a better view of its connexion with the semilunar ganglion.

A Aorta.
B Right emulgent artery.

a Diaphragm.
b Cut edge of the liver.
c Right renal capsule.

1 Phrenic nerve.
2 Ganglion formed by a branch of the phrenic nerve and the right semilunar ganglion.
3 Great splanchnic nerve.
4 A branch from the seventh thoracic ganglion to join the great splanchnic nerve.
5 A branch from the eighth thoracic ganglion to join the great splanchnic nerve.
6 A branch from the tenth thoracic ganglion to join the great splanchnic nerve.
7. 7. 7 Branches from the thoracic ganglia and the great splanchnic nerve to the cellular membrane, &c., on the outside of the aorta.
8. 8 Right semilunar ganglion.
9 Communication of the right semilunar ganglion and renal capsule.
10 Lesser splanchnic nerve to the emulgent plexus.
11 A branch from the prolongation to the emulgent plexus.
12 Emulgent plexus.
13 Part of the spermatic plexus.
14 Aortic plexus.
15 A branch from the eighth thoracic ganglion to the seventh dorsal nerve.
16 A branch from the ninth thoracic ganglion to the eighth dorsal nerve.
17 Two branches from the tenth thoracic ganglion to the ninth dorsal nerve.
18 Two branches from the eleventh thoracic ganglion to the tenth dorsal nerve.
19 Branches from the prolongation to the eleventh dorsal nerve.
20 A branch from the prolongation to the twelfth dorsal nerve.
21 A branch from the first lumbar ganglion to the twelfth dorsal nerve.
22 Branches from the first lumbar ganglion to the first lumbar nerve.
23 Branches from the second lumbar ganglion to the first lumbar nerve.
24 Seventh dorsal nerve.
25 Eighth dorsal nerve.
26 Ninth dorsal nerve.
27 Tenth dorsal nerve.
28 Eleventh dorsal nerve.
29 Twelfth dorsal nerve.
30 First lumbar nerve.
31 Eighth thoracic ganglion of the sympathetic nerve.
32 Ninth thoracic ganglion of the sympathetic nerve.
33 Tenth thoracic ganglion of the sympathetic nerve.
34 Eleventh thoracic ganglion of the sympathetic nerve.
35 First lumbar ganglion of the sympathetic nerve.
36 Second lumbar ganglion of the sympathetic nerve.

FIGURE II.

This figure is principally intended for showing the semilunar ganglia, and their connexions with the renal capsules.

A Aorta.
B Hepatic artery.
C Splenic artery.
D Superior mesenteric artery.
E Right emulgent artery.
F Left emulgent artery.

a Diaphragm.
b Renal capsule.
c Kidneys.

1 A branch of the right phrenic nerve.
2 The ganglion forming the communication between the right phrenic nerve and the right semilunar ganglion.
3 Semilunar ganglion.
4 Communication between the semilunar ganglion and the renal capsule.
5 Hepatic plexus.
6 Splenic plexus.
7 Superior mesenteric plexus.
8 Emulgent plexus.
9 Spermatic plexus.
10 Aortic plexus.
11 First lumbar ganglion of the sympathetic nerve.
12 Second lumbar ganglion of the sympathetic nerve.
13 Third lumbar ganglion of the sympathetic nerve.

FIGURE III.

This figure exhibits the prolongation of the sympathetic nerve, and the greater and lesser splanchnic nerves passing through the diaphragm; the connexion of the right semilunar ganglion with the renal capsule; the junction between the right semilunar ganglion and the right phrenic nerve, and the branches sent from this to the inferior cava, and to communicate with the right hepatic plexus; the right kidney dissected for showing the branches of the emulgent plexus following the ramifications of the emulgent artery.

A Aorta.
B Right hepatic artery.
C Left hepatic artery.
D Phrenic artery.
E Superior mesenteric artery.
F Emulgent artery divided.
G Spermatic artery.
H Inferior cava.

a Diaphragm.
b Cut edge of the liver.
c Renal capsule.
d Kidney.

1 Semilunar ganglion.
2 Branches of the hepatic plexus accompanying the right hepatic artery.
3 Branches of the right hepatic plexus accompanying the left hepatic artery.
4 Phrenic nerve.
5 The junction between the right phrenic nerve and the right semilunar ganglion; in this subject it has less the appearance of a ganglion than usual.
6 A branch from the junction 5 to the outside of the inferior cava.
7 A branch from the junction 5 to communicate with the hepatic plexus.
8 A communication between the semilunar ganglion and the renal capsule.
9 Great splanchnic nerve.
10 Lesser splanchnic nerve.
11 Prolongation of the sympathetic nerve to the first lumbar ganglion.
12. 12 Two branches from the first lumbar ganglion to the twelfth dorsal nerve.
13 Emulgent plexus.
14 Spermatic plexus.
15 First lumbar ganglion.
16 Superior mesenteric plexus.
17 Aortic plexus.

FIGURE IV.

This figure shows the continuation of the sympathetic nerve on each side of the sacrum to its termination.

a Fifth lumbar vertebra.
b Sacrum.

1 Fifth lumbar nerve.
2 First sacral nerve.
3 Second sacral nerve.
4 Third sacral nerve.
5 Fourth sacral nerve.
6 Fifth sacral nerve.
7 Prolongation of the sympathetic nerve.
8 The communication between the last lumbar ganglion and the fifth lumbar nerve.
9 A branch from the first sacral ganglion to the fifth lumbar nerve.
10 A branch from the first sacral ganglion to the first sacral nerve.
11 A branch from the second sacral ganglion to the first sacral nerve.
12 A branch from the second sacral ganglion to the second sacral nerve.
13 A branch from the third sacral ganglion to the second sacral nerve.
14 A branch from the fourth sacral ganglion to the third sacral nerve.
15 A branch from the fifth sacral ganglion to communicate with the fourth and fifth sacral nerves.
16 Branches communicating with the single ganglion and the fifth and sixth sacral nerves; and some passing through fissures in the ligamentous covering of the bone of the coccyx, and communicating with the posterior plexus of the sacral nerves, and giving filaments to the ligaments and integuments near the extremity of the bone of the coccyx.
17 First sacral ganglion of the sympathetic nerve.
18 Second sacral ganglion of the sympathetic nerve.
19 Third sacral ganglion of the sympathetic nerve.
20 Fourth sacral ganglion of the sympathetic nerve.
21 Fifth sacral ganglion of the sympathetic nerve.
22 The single ganglion of the sympathetic nerve.

Fig. 2.

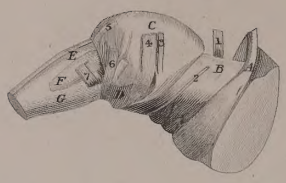


Fig. 3.

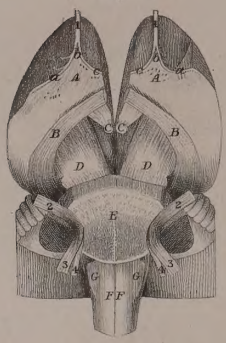


Fig. 4.

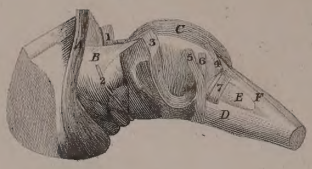


Fig. 1.

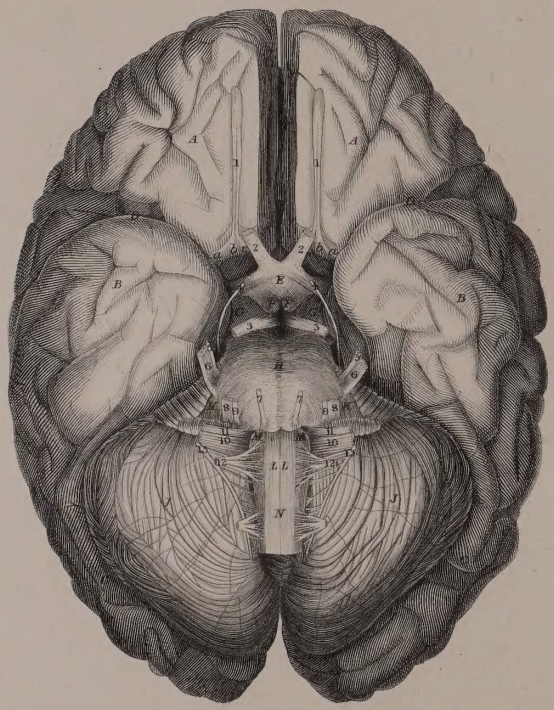


Fig. 5.

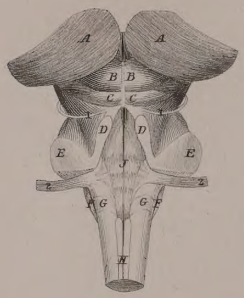


Fig. 6.

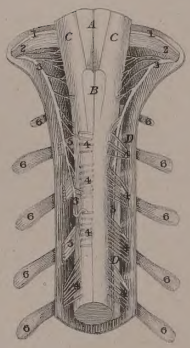


Fig. 8.

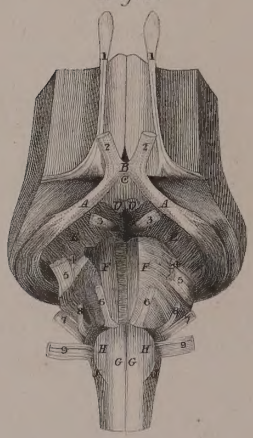


Fig. 7.

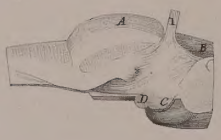


Fig. 9.

Drawn by West.

Engraved by Finden.

PLATE X.

FIGURE I.

After removing the membranes, the brain was kept in alcohol several weeks before the delineation of its different parts was made.

A Anterior lobes of the brain.
B Middle lobes of the brain.
C Posterior lobes of the brain.
D Fissure of Sylvius.
E Infundibulum.
F Mammillary bodies.
G Crura of the brain.
H Annular tubercle.
J Cerebellum.
K Crura of the cerebellum.
L Anterior pyramidal bodies.
M Olivary bodies.
N Beginning of the spinal chord.

1 Olfactory, or first pair of nerves: *a*, external; *b*, middle; *c*, internal root.
2 Optic, or second pair of nerves.
3 Common oculo-muscular, or third pair of nerves.
4 Superior oblique oculo-muscular, or fourth pair of nerves.
5 Anterior portion of the three-fold, or fifth pair of nerves.
6 Posterior portion of the three-fold, or fifth pair of nerves.
7 Abducent oculo-muscular, or sixth pair of nerves.
8 Proper auditory, or soft portion of the seventh pair of nerves.
9 Facial, or hard portion of the seventh pair of nerves.
10 Par vagum, pneumo-gastric, or eighth pair of nerves.
11 Glosso-pharyngeal, or associate of the eighth pair of nerves.
12 Myo-glossal, hypo-glossal, or ninth pair of nerves.
13 Accessory nerves.

FIGURE II.

This figure shows the connexion of the anterior portion of the fifth nerve, with the annular tubercle on the right side.

A Optic tract.
B Right crus of the brain.
C Annular tubercle.
D Part from which the crus of the cerebellum was separated.
E Anterior pyramidal body.
F Olivary body.
G Restiform body.

1 Common oculo-muscular nerve.
2 Superior oblique oculo-muscular nerve.
3 Anterior portion of the fifth nerve, and its connexion with the annular tubercle.
4 Posterior portion of the fifth nerve; also, the connexion of some of its fibrils with the part contiguous to that giving origin to the anterior portion.
5 Abducent oculo-muscular nerve.
6 Proper auditory nerve.
7 Right trunk of the par vagum, and the glosso-pharyngeal nerve.

FIGURE III.

THIS figure shows the connexion of the olfactory nerve with the brain, and part of the fifth; the greatest portion of the annular tubercle, and the crura of the cerebellum, has been removed for tracing the posterior portion of the fifth to its connexion with the restiform body and the auditory nerve.

A Portion perforated by blood-vessels.
B Optic tracts.
C Mammillary bodies.
D Crura of the brain.
E Annular tubercle partly removed.
F Anterior pyramidal bodies.
G Olivary bodies.

1 Olfactory nerves; *a*, external; *b*, middle; *c*, internal root.
2 Posterior portion of the fifth nerve.
3 Proper auditory nerve.
4 Facial nerve.

FIGURE IV.

PART of the annular tubercle, and the crus of the cerebellum on the left side, have been removed, for showing the extension of the posterior trunk of the fifth to the restiform body, its union with the auditory nerve, and its connexion with the annular tubercle and crus of the cerebellum.

A Optic tract.
B Crus of the brain.
C Annular tubercle.
D Restiform body.
E Olivary body.
F Anterior pyramidal body.

1 Common oculo-muscular nerve.
2 Superior oblique oculo-muscular nerve.
3 Posterior portion of the fifth nerve.
4 Abducent oculo-muscular nerve.
5 Proper auditory nerve.
6 Facial nerve.
7 Left trunk of the par vagum, and the glosso-pharyngeal nerve.

FIGURE V.

THIS figure shows the origin of the superior oblique oculo-muscular nerve, from the portion of the process extending from the cerebellum to the testes, near the valve of Vieussens; and that of the proper auditory nerve from the fourth ventricle.

A Thalami of the optic nerve.
B Nates.
C Testes.
D Processes from the cerebellum to the testes.
E Crura of the cerebellum cut off.
F Olivary bodies.
G Restiform bodies.
H Posterior pyramidal bodies.
J Fourth ventricle.

1 Superior oblique oculo-muscular nerves.
2 Proper auditory nerves.

FIGURE VI.

THIS figure shows part of the oblong and spinal medulla; the filaments of each posterior bundle of the spinal nerves have been divided, for exposing the origins of the accessory nerves.

A Fourth ventricle.
B Posterior pyramidal bodies.
C Restiform bodies.
D Denticulated ligament.

1 Glosso-pharyngeal nerves.
2 Par vagum.
3 Accessory nerves, and their connexion with the spinal and oblong medulla, and the fibrils of the first, second, and third cervical nerves.
4 Posterior bundles of the first, second, and third cervical nerves of the right side, divided.
5 Anterior bundles of the cervical nerves.
6 Ganglia of the suboccipital and cervical nerves.

FIGURE VII.

After dividing the portion of brain in the median line, the roots of the common oculo-muscular nerve of the left side were traced by carefully removing a little more of the brain from the cut surface.

A Annular tubercle.
B Left crus of the brain.
C Nates.
D Testis.

1 Common oculo-muscular nerve, with its roots diverging towards the nates and testis.

FIGURE VIII.

Portions of the anterior lobes of the brain and the perforated part, situated between the optic tracts and the roots of the olfactory nerves, have been cut away; the surface of each optic tract has been removed for showing its fibrous structure; the left side of the annular tubercle has been partly removed, for exposing the continuation of the posterior portion of the fifth nerve to the restiform body.

A Optic tracts.
B Optic commissure.
C Infundibulum.
D Mammillary bodies.
E Crura of the brain.
F Annular tubercle, with the left side partly removed.
G Anterior pyramidal bodies.
H Olivary bodies.
J Restiform bodies.

1 Olfactory nerve; *a*, external; *b*, middle; *c*, internal root.
2 Optic nerve.
3 Common oculo-muscular nerve.
4 Anterior portion of the fifth nerve.
5 Posterior portion of the fifth nerve.
6 Abducent oculo-muscular nerve.
7 Proper auditory nerve.
8 Facial nerve.
9 Par vagum, and glosso-pharyngeal nerves.

FIGURE IX.

This figure shows the right trunk of the par vagum and the glosso-pharyngeal nerve arising from the restiform body.

A Annular tubercle.
B Olivary body.
C Restiform body.

1 Proper auditory nerve.
2 Facial nerve.
3 Glosso-pharyngeal nerve.
4 Right trunk of the par vagum.

Fig. 2.

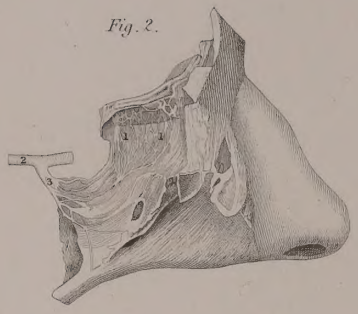


Fig. 3.

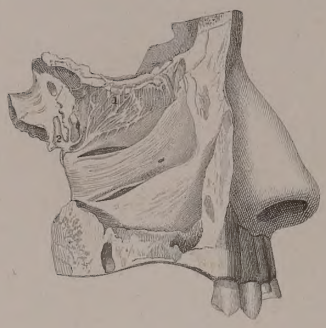


Fig. 4.

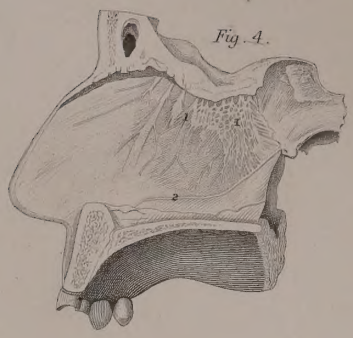


Fig. 1.

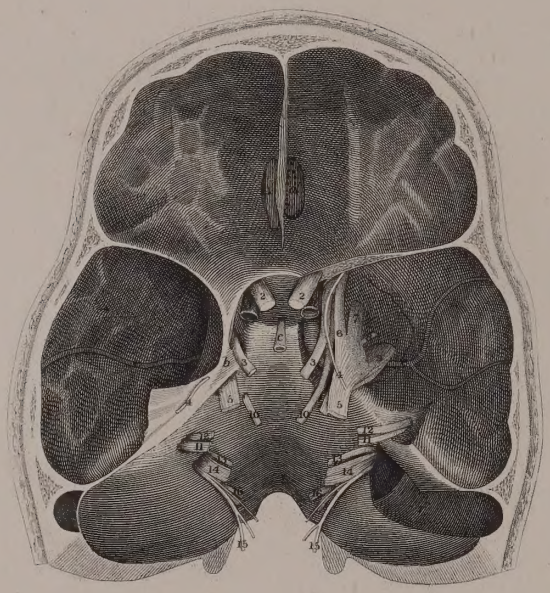


Fig. 5.

Fig. 6.

Fig. 7.

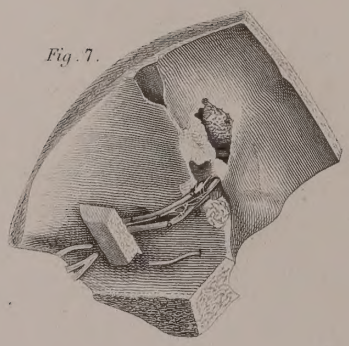


Fig. 8.

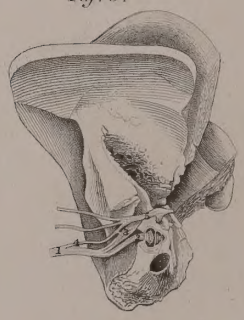
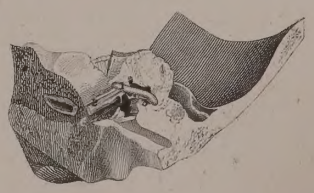


Fig. 9.



Drawn by West.

Engraved by Finden.

PLATE XI.

FIGURE I.

The vertex and posterior part of the cranium have been removed; on the right side the nerves have been traced to their exit from the cranium, but on the left have been allowed to remain in their natural state, so that the processes of the dura mater have not been divided. On the right side the usual third trunk of the fifth is divided into two parts, which pass out at separate foramina.

a Cribriform plate of the ethmoid bone.
b Processes of dura mater, extending from the petrous portion of the temporal bone to the clinoid processes of the sphenoid: these have been removed on the right side.
c Infundibulum.
d Internal carotid artery.
e Middle artery of the dura mater.
f Part of the lateral sinus.

1 Bulbous extremity of the olfactory nerve.
2 Optic nerves.
3 Common oculo-muscular, or third pair of nerves.
4 Superior oblique oculo-muscular, or fourth pair of nerves.
5 Threefold, or fifth pair of nerves.
6 First trunk of the fifth pair of nerves.
7 Second trunk of the fifth pair of nerves.
8 Small division of the third trunk of the fifth pair of nerves; its continuation is marked 5 figure 5, and 2 figure 6, P. XIV.
9 Large division of the third trunk of the fifth pair of nerves; its continuation is marked 4 figure 5, P. XIV.
10 Abducent oculo-muscular, or sixth pair of nerves.
11 Proper auditory nerves.
12 Facial nerves.
13 Glosso-pharyngeal nerves.
14 Par vagum, or eighth pair of nerves.
15 Accessory nerves.
16 Ninth pair of nerves.

FIGURE II.

The turbinated bones, and all the other portions forming the exterior surface of the nose, have been removed; many branches of the olfactory nerve are seen passing backwards towards a point, and communicating with filaments from the spheno-palatine ganglion.

1 Branches of the olfactory nerve.
2 Second trunk of the fifth nerve.
3 Spheno-palatine ganglion.

FIGURE III.

This figure is taken from a preparation made in the same manner as the preceding.

1 Branches of the olfactory nerve.
2 Spheno-palatine ganglion.

FIGURE IV.

This figure is taken from a preparation in which the septum has been removed, for the purpose of showing the branches of the olfactory nerve on the surface which adhered to the bone.

1 Branches of the olfactory nerve.
2 Branch from the spheno-palatine ganglion passing through the incisive foramen.

FIGURE V.

This figure shows the retina; and is taken from an eye that had been for some time immersed in alcohol, before the sclerotic and choroid coats were removed.

FIGURE VI.

In the preparation from which this figure is taken, the sclerotic coat has been in a great measure removed, for showing the continuation of the ciliary nerves as far as the ciliary ligament.

1 Third nerve.
2 Nasal branch of the first trunk of the fifth communicating with the lenticular ganglion, and also sending some ciliary branches on the choroid coat.
3 Lenticular ganglion sending off the ciliary nerves.

FIGURE VII.

This figure shows the auditory and facial nerves, and the middle portion.

1 Auditory nerve.
2 Portion of the auditory nerve entering the cochlea.
3 Portion of the auditory nerve entering the vestibule.
4 Middle portion between the auditory and facial nerves.
5 Facial nerve.

FIGURE VIII.

This figure shows the auditory and facial nerves, and the middle portion spread out, and their communications.

1 Auditory nerve.
2 Portion of the auditory nerve entering the cochlea.
3 Portion of the auditory nerve entering the vestibule.
4 Middle portion between the auditory and facial nerves.
5 Facial nerve; it is seen enlarged just where it receives the superior branch of the vidian.

FIGURE IX.

This figure is taken from a preparation in which the hammer has been removed, and the inferior portion of the membrane of the tympanum left. The tensor muscle of the tympanum is shown with its tendon detached from the hammer, and a considerable branch of the facial nerve terminating in it. The muscle of the stirrup is also delineated, and a small branch of the facial nerve entering it.

1 Facial nerve.
2 A branch of the facial nerve given to the tensor muscle of the tympanum.
3 A branch of the facial nerve given to the muscle of the stirrup.

Fig. 1.

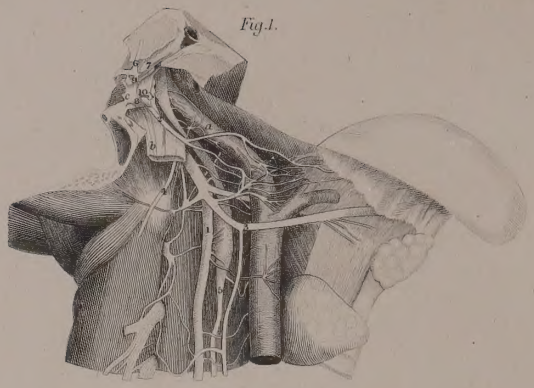


Fig. 5.

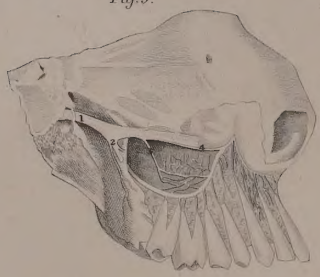


Fig. 4.

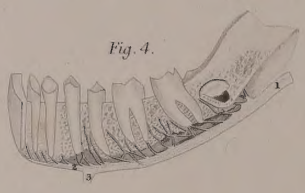


Fig. 2.

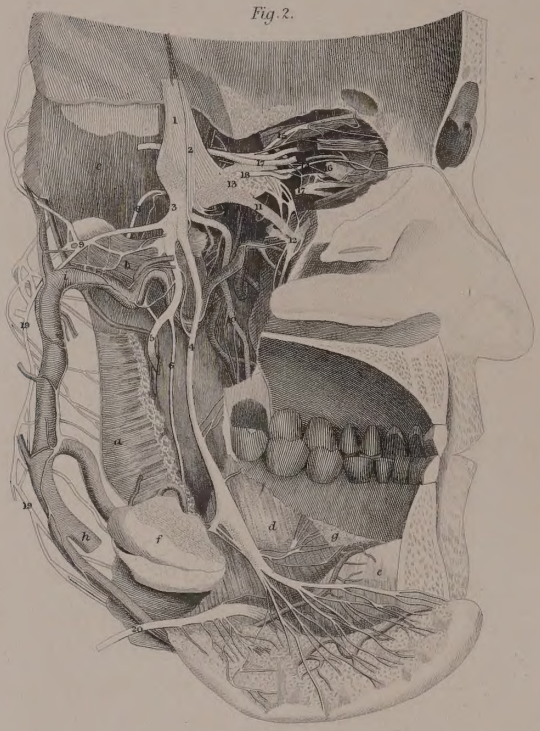


Fig. 7.

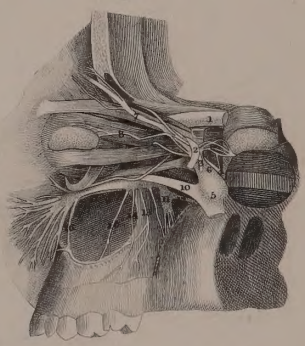


Fig. 6.

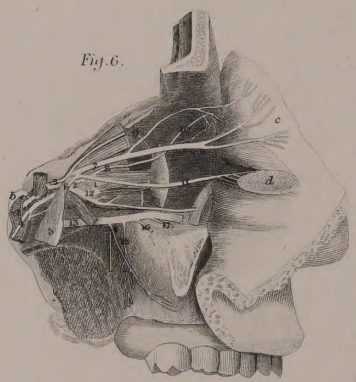
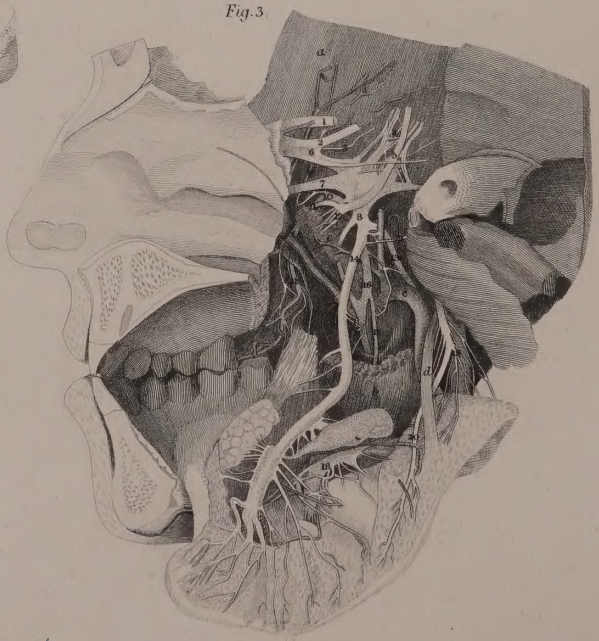


Fig. 3.



Drawn by West.

Engraved by Finden.

PLATE XII.

FIGURE I.

This figure shows the tympanine branch of the glosso-pharyngeal nerve; its superior ramification, in passing to the point of union between the superior branch of the Vidian and the facial nerves, sends a filament forwards to terminate underneath the dura mater; its inferior portion passes through an aperture in the bone, to join the sympathetic nerve on the internal carotid artery.

a Internal carotid artery.
b Internal jugular vein.
c Inferior surface of the petrous portion of the temporal bone, forming one of the boundaries of the tympanum.

1 Right trunk of the par vagum.
2 Glosso-pharyngeal nerve.
3 Ninth nerve.
4 Accessory nerve.
5 Sympathetic nerve.
6 Facial nerve.
7 Superior branch of the Vidian nerve.
8 Tympanine nerve of the glosso-pharyngeal.
9 A branch of the tympanine nerve, joining the point of union between the superior branch of the Vidian and the facial nerve.
10 A branch of the tympanine nerve, passing to the plexus of the sympathetic on the internal carotid artery.

FIGURE II.

After a perpendicular section of the head, the occipital bone was removed, as well as the greatest part of the temporal, the sphenoid, and the orbital plate of the frontal; the greatest part of the pterygoid muscles was removed, and the membranous attachment of the tongue separated from the lower jaw. The figure exhibits the fifth nerve, but most particularly its third trunk, the posterior portion forming the Gasserian ganglion, and the anterior very slightly connected with this; the branch of the nasal nerve from the first trunk passing towards the ala of the nose; the spheno-palatine ganglion, attached to the second trunk, and sending branches upwards to the sixth nerve; the palatine branches passing downwards, and a branch accompanying the internal maxillary artery, and communicating on this with one from the inferior dental nerve; and the superficial temporal, communicating also on the external carotid with the facial, and the branches of the sympathetic, forming the pharyngeal plexus.

a Part of the internal pterygoid muscle.
b Part of the external pterygoid muscle.
c Temporal muscle.
d Mylo-hyoideal muscle.

e Genio-hyo-glossal muscle.
f Submaxillary gland.
g Part of the sublingual gland.
h External carotid artery.
i Internal maxillary artery.

1 Posterior portion of the fifth nerve, terminating in the Gasserian ganglion.
2 Anterior portion of the fifth nerve, giving a filament to the deep temporal nerve, one to that sent to the masseter muscle, and to the gustatory nerve, and then terminating in the buccal.
3 Third trunk of the fifth nerve.
4 Gustatory nerve from the third trunk of the fifth.
5 Inferior dental nerve from the third trunk of the fifth.
6 A branch of the inferior dental nerve, to pass to the mylo-hyoideal muscle and the maxillary portion of the digastric.
7 Deep temporal branch from the third trunk of the fifth to the temporal muscle.
8 A branch of the third trunk of the fifth to the masseter muscle.
9 Superficial temporal branch from the third trunk of the fifth, communicating with the facial nerve.
10 Buccal nerve.
11 Second trunk of the fifth.
12 Spheno-palatine ganglion.
13 First trunk of the fifth.
14 Nasal nerve of the first trunk of the fifth.
15 Supra-orbital nerve of the first trunk of the fifth.
16 Optic nerve.
17 Third nerve.
18 Sixth nerve.
19 Branches of the facial nerve.
20 Ninth nerve.

FIGURE III.

AFTER a perpendicular section of the head, the greatest part of the temporal, sphenoid, and palatine bones was removed, and the membranous attachments of the tongue separated from the inner side of the lower jaw; the internal pterygoid muscle was divided. This figure shows the divisions of the fifth nerve, but more particularly the terminations of the gustatory and glosso-pharyngeal nerves. It shows also the communications of the gustatory with the ninth, the course of the buccal nerve to the mouth, and its branches given to the external pterygoid muscle; the inferior dental nerve; and its branch passing in the superficial groove, on the inner side of the lower jaw, to terminate in the inferior belly of the digastric, and the mylo-hyoideal muscles; the deep temporal branch, giving off the branch to the masseter and temporal muscles; and the superficial temporal passing forward near the condyloid process of the lower jaw, and communicating with branches of the facial nerve.

a Temporal muscle.
b Internal pterygoid muscle divided.
c External pterygoid muscle divided.
d Stylo-pharyngeal muscle.
e Internal maxillary artery.

1 Optic nerve.
2 Third nerve.
3 Fourth nerve.
4 Fifth nerve, terminating in the Gasserian ganglion.
5 Anterior portion of the fifth nerve.
6 First trunk of the fifth.
7 Second trunk of the fifth.
8 Third trunk of the fifth.
9 Deep temporal nerve of the third trunk of the fifth to the temporal muscle.
10 A branch from the third trunk of the fifth to the masseter muscle.
11 Buccal nerve of the third trunk of the fifth.
12 Branches of the third trunk of the fifth to the external pterygoid muscle.
13 Superficial temporal nerve of the third trunk of the fifth.
14 Gustatory nerve.
15 A branch of the gustatory nerve to the internal pterygoid muscle.
16 Inferior dental nerve.
17 A branch of the inferior dental nerve to the inferior belly of the digastric, and mylo-hyoideal muscles.

18 Ninth nerve communicating with the gustatory.
19 Branches of the glosso-pharyngeal nerve to the stylo-pharyngeal muscle.
20 Continuation of the glosso-pharyngeal nerve to the back of the tongue, the tonsil, and membrane near the epiglottis.
21 Chord of the tympanum.

FIGURE IV.

After softening the lower jaw in the same manner as for the preparation from which the following figure was taken, the canal containing the nerve was laid open, and the inferior part of the jaw removed, so as to expose the nerves passing to the teeth and the alveolar processes.

1 Inferior dental nerve, giving filaments to the molar and bicuspidated teeth, and the alveolar processes.
2 A branch sent forward to supply the cuspidated and two incisive teeth, and the alveolar processes.
3 Continuation of the nerve, as it passes out of the foramen near the chin.

FIGURE V.

After separating the flesh from the second trunk of the fifth nerve, the whole of the skull was removed except the portions represented in this figure. It was then immersed in diluted muriatic acid, until the bone became just soft enough to be cut with a knife, and after it had been washed with water, was placed in alcohol. It shows the first dental nerve giving filaments to the gums, and after piercing the bony parietes of the antrum, passing to a groove formed just above the fangs of the teeth, where it is joined by the second dental nerve from the infra-orbital, as this is passing underneath the orbit, and from this union a beautiful plexus is seen spreading on the exterior surface of the membrane lining the antrum, which, by the aid of a magnifying glass, appears to consist of nervous filaments; the third dental nerve is seen joining the union of the two preceding ones, and passing from the infra-orbital nerve just before this emerges from the infra-orbital foramen. From the nerve thus formed, filaments may be seen passing both to the teeth and the surrounding alveolar processes.

1 Second trunk of the fifth nerve.
2 First dental nerve.
3 Second dental nerve.
4 Third dental nerve.

FIGURE VI.

After removing the lower jaw, and the vertex and sides of the skull, a separation was made at the junction of the sphenoid and occipital bones; the globe of the eye was cut away near to its connexion with the optic nerve, to allow room for exhibiting the nasal branch of the first trunk of the fifth going to the angle of the eye, and the branch passing to the nose first through a small foramen in the orbit, and then one of those in the cribriform plate of the ethmoid bone; the origin of the superior dental nerves, from the second trunk of the fifth, is also delineated.

a Internal carotid artery.
b Pituitary gland.
c Skin of the forehead.
d Lachrymal gland.

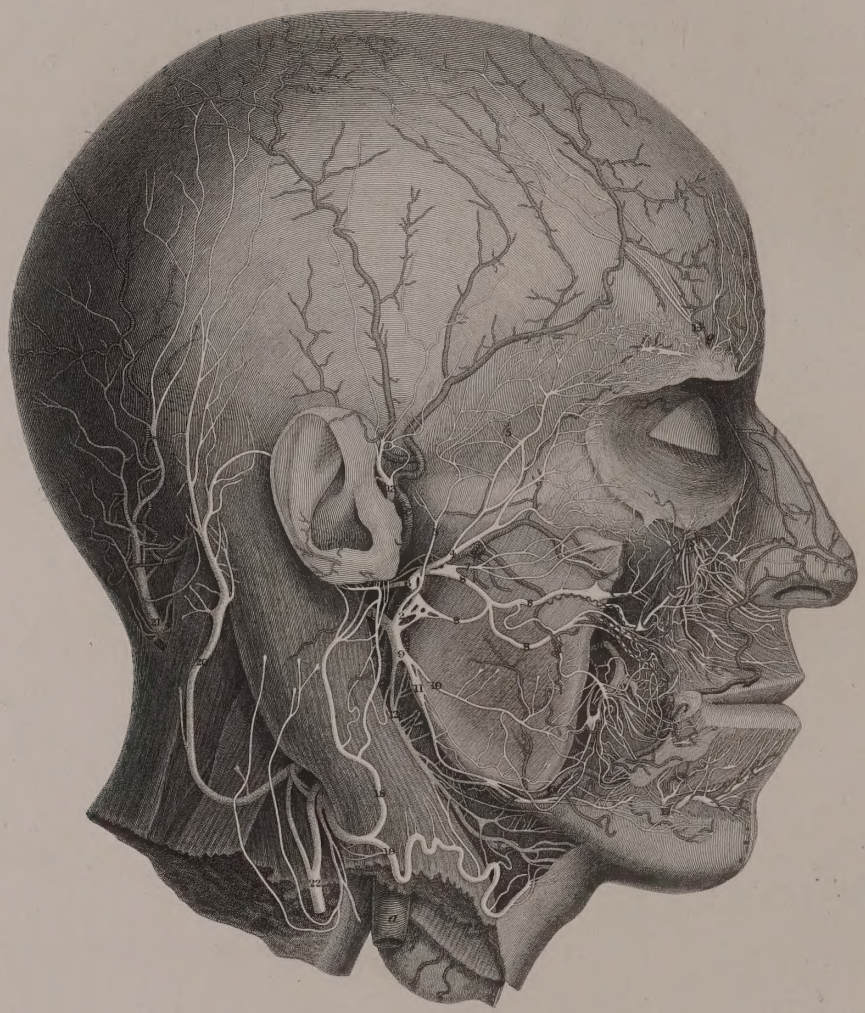
1 Optic nerve.
2 Third nerve.
3 Fourth nerve.

4 Sixth nerve.
5 Part of the Gasserian ganglion.
6 First trunk of the fifth nerve.
7 Supra-orbital branch of the first trunk of the fifth.
8 Nasal branch of the first trunk of the fifth.
9 A branch of the nasal nerve, passing through a canal in the ethmoid cells to enter the nose by a foramen in the cribriform plate.
10 A branch of the nasal nerve, terminating in the periosteum and parts at the inner angle of the eye, and communicating with a branch of the supra-orbital nerve.
11 Lachrymal nerve.
12 Ciliary ganglion and nerves.
13 Second trunk of the fifth nerve.
14 First dental nerve from the second trunk of the fifth, giving filaments to the gums and membrane of the mouth, and then passing to the canal above the alveolar processes.
15 A branch from the second trunk of the fifth to the gums, &c.
16 Second dental nerve from the second trunk of the fifth.
17 Third dental nerve from the second trunk of the fifth.

FIGURE VII.

This figure is taken from the opposite side of the same preparation as the preceding. It shows the nerves of the orbit and the superior dental nerves, exposed further than in the right side. Some filaments are seen passing to the pituitary gland from the plexus on the internal carotid artery.

1 Optic nerve.
2 Third nerve.
3 Fourth nerve.
4 Sixth nerve.
5 Gasserian ganglion.
6 First trunk of the fifth.
7 Supra-orbital branch of the first trunk of the fifth.
8 Lachrymal nerve.
9 A plexus formed on the internal carotid artery, and giving filaments to the pituitary gland.
10 Second trunk of the fifth.
11 Spheno-palatine ganglion.
12 Vidian nerve.
13 First dental nerve from the second trunk of the fifth, giving filaments to the gums and membrane of the mouth, and then passing to the canal above the alveolar processes.
14 A branch from the second trunk of the fifth to the gums, &c.
15 Second dental nerve from the second trunk of the fifth, to join the first in the canal above the alveolar processes.
16 Third dental nerve from the second trunk of the fifth, to join the preceding in the canal above the alveolar processes.



Drawn by West.

Engraved by Finden.

PLATE XIII.

After a perpendicular section through the head and neck, the surface of the skin and scalp was removed, and the cellular membrane and fat carefully separated, so as to expose the extensive range of branches of the facial nerve, the supra-orbital, the infra-orbital, the superficial temporal, the inferior maxillary, the buccal, the second cervical, aud the communications between all these; and also the distribution of the occipital branch of the posterior trunk of the first cervical nerve.

---

a Common carotid artery.
b External carotid artery.
c Facial artery.
d Transverse facial artery.
e Temporal artery.
f Occipital artery.
g Supra-orbital arteries.

1 Trunk of the facial nerve.
2 Superior division of the facial nerve.
3 Temporal branch of the facial nerve to the occipito-frontal muscle.
4 A branch of the facial nerve to the occipito-frontal muscle and the orbicular muscle of the eye.
5 A branch of the facial nerve, piercing the temporal fascia to communicate with the deep temporal and malar nerves.
6 Branches of the facial nerve, passing round the temporal artery to communicate with the superficial temporal nerve of the third trunk of the fifth.
7 A branch of the facial nerve to the zygomatic muscle and fat.
8 Branches of the facial nerve, sending filaments to the inferior part of the orbicular muscle and the eyelids; communicating with branches of the infra-orbital nerve, and giving filaments to the levator muscles of the angle of the mouth and nose, and sending a branch to the angle of the eye to give filaments to this part, and unite with a branch of the nasal nerve: after communicating with the buccal nerve, the principal portion of these branches becomes united with those of the infra-orbital nerve, to terminate in the muscles and skin of the nose and upper lip.
9 Inferior division of the facial nerve.
10 A branch of the facial nerve, terminating in the fat and skin, after communicating with the buccal.
11 A branch of the facial nerve, communicating with the buccal and branches of the inferior maxillary nerve, and terminating in the muscles of the lower lip.
12 A branch of the facial nerve, communicating with the posterior aural and facial branches of the second cervical nerve; then passing towards the angle of the jaw, and giving numerous filaments to the parotid gland and skin; and after communicating with the branch of the second cervical, near the angle of the jaw, terminating along with this in the cutaneous muscle and skin.
13 Superficial temporal nerve of the third trunk of the fifth, terminating on the skin of the temple and auricle.
14 Supra-orbital nerve, sending branches to the occipito-frontal muscle and skin of the forehead, and communicating with filaments of the facial nerve, and sending branches backwards towards the occiput, to terminate on the scalp, and meet several filaments of the occipital nerve.

15 Infra-orbital nerve, dividing into branches; some of which communicate with two large branches from the superior division of the facial nerve, in passing to their termination on the skin of the nose, and the muscles and skin of the upper lip.

16 Buccal nerve of the third trunk of the fifth, dividing and communicating with branches of the facial nerve, and terminating on the buccinator muscle, the buccal glands, and the mucous membrane of the mouth.

17 Inferior maxillary nerve, dividing into branches, and communicating with branches of the facial, and terminating on the muscles and skin of the lower lip.

18 A branch of the second cervical nerve, communicating with a branch of the facial, and terminating on the skin at the posterior part of the ear, and the side of the face.

19 A branch of the second cervical nerve, communicating with branches of the facial, and terminating on the cutaneous muscle and skin near the angle of the jaw.

20 A branch of the second cervical nerve, terminating on the scalp of the occiput.

21 Occipital nerve, which is the continuation of the posterior trunk of the first cervical nerve, giving filaments to the occipito-frontal muscle, and terminating on the scalp at the posterior and lateral parts of the head, and sending some of its branches to meet those of the supra-orbital nerve.

22 A branch of the second cervical nerve, passing to the third.

Fig. 1.

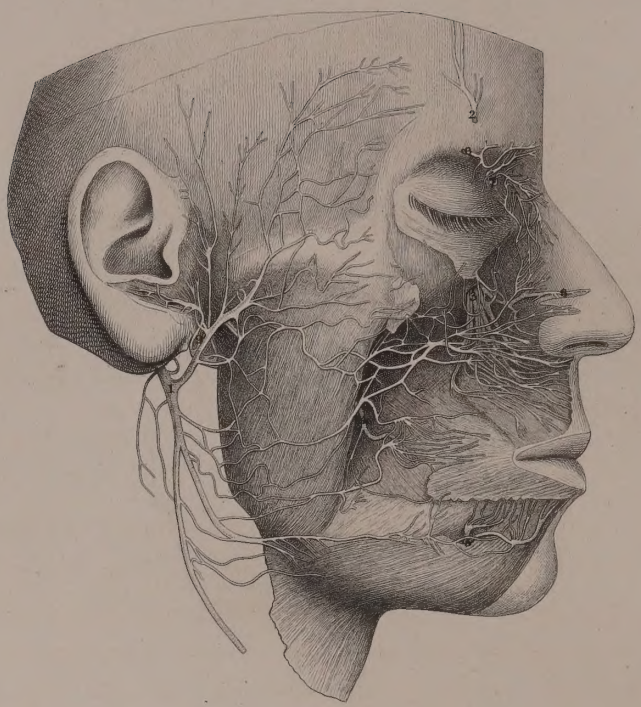


Fig. 3.

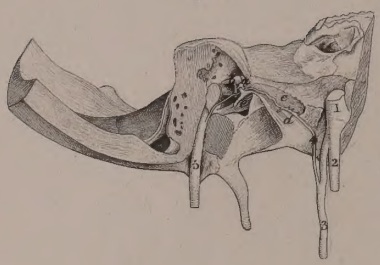
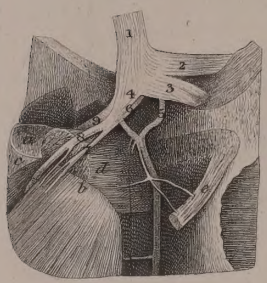


Fig. 4.

Fig. 5.



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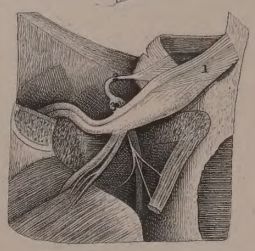

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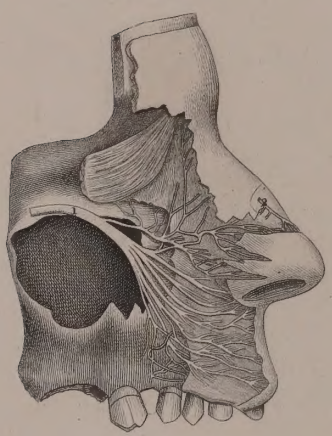


Fig. 2.

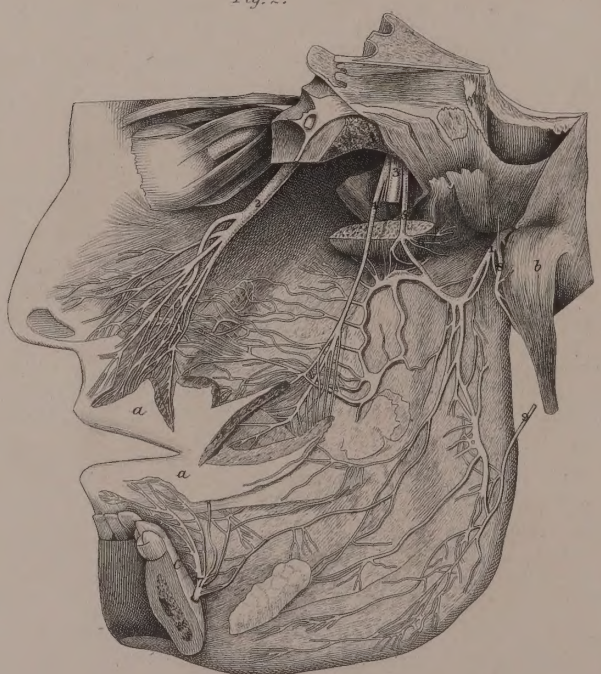
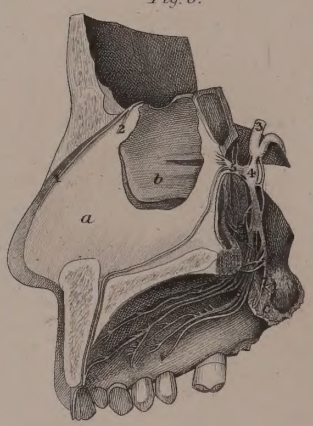


Fig. 8.



Drawn by West.

Engraved by Finden.

PLATE XIV.

FIGURE I.

This figure shows the communications between filaments of the nasal and facial nerves at the inner angle of the eye; the branch of the nasal, after having passed through the ethmoid cells, dividing and giving one branch to the Schneiderian membrane of the septum, and sending the other on the posterior surface of the nasal bone, and then between this and the cartilage, to communicate with a branch of the infra-orbital nerve near the ala of the nose; also the connexion of the superficial temporal nerve of the third trunk of the fifth with the facial, and its filaments given to the auricle.

1 Facial nerve.
2 Supra-orbital nerve.
3 Infra-orbital nerve.
4 Buccal nerve.
5 Inferior maxillary nerve.
6 A branch of the supra-orbital nerve, communicating with a branch of the nasal passing out at the inner angle of the eye.
7 A branch of the nasal nerve, communicating with a branch of the supra-orbital, and also with a branch of the facial.
8 A branch of the infra-orbital nerve, joining a branch of the nasal which has passed down at the posterior part of the nasal bone.
9 Superficial temporal nerve, from the third trunk of the fifth, communicating with the facial, and sending a branch to the auricle, and then terminating on the temple.

FIGURE II.

A perpendicular section was made through the skull; the scalp and skin, together with the occipito-frontal and the muscles of the face, were then in a great degree separated from their attachments; the bones were broken, and most of the pieces carefully taken away; the side of the lower jaw was removed, after its division, close to the foramen near the chin; the dissection of the nerves was then made on the inner surface, for the purpose of tracing the branches of the facial nerve to the fat and skin.

a Membrane of the mouth.
b Superior belly of the digastric muscle.
c Divided portion of the lower jaw, raised so as to show the inferior maxillary nerve emerging from its foramen.

1 Facial nerve.
2 Infra-orbital nerve.
3 Third trunk of the fifth nerve.
4 Buccal nerve.
5 Superficial temporal nerve.
6 Filaments of the superficial temporal nerve to the capsular ligament of the lower jaw.
7 Inferior maxillary nerve.
8 Digastric branch of the facial nerve.
9 A branch of the second cervical nerve.

FIGURE III.

This figure shows the chord of the tympanum united with the gustatory nerve at its anterior extremity, and the facial at its posterior near the stylo-mastoid foramen; and small filaments passing from the chord of the tympanum to the tensor and laxator muscles of the tympanum.

a Hammer.
b Anvil.
c Tensor muscle of the tympanum.
d Laxator muscle of the tympanum.
e Membrane of the tympanum.

1 Third trunk of the fifth nerve.
2 Inferior dental nerve about to enter the lower jaw.
3 Gustatory nerve.
4 Chord of the tympanum.
5 Facial nerve.

FIGURE IV.

This figure shews all the branches of the common oculo-muscular nerve, except that joining the lenticular ganglion.

a Levator muscle of the eye.
b Levator muscle of the upper eye-lid.
c Adductor muscle of the eye.
d Depressor muscle of the eye.
e Abductor muscle of the eye.
f Inferior oblique muscle of the eye.

1 Optic nerve divided.
2 A branch of the common oculo-muscular nerve given to the levator muscles of the eye and upper eye-lid.
3 Principal part of the common oculo-muscular nerve given to the adductor, the depressor, and inferior oblique muscles.

FIGURE V.

This figure shows the continuation of the four trunks of the fifth nerve of the right side, represented in Figure I. P. XI.

a Neck of the condyle of the lower jaw.
b Temporal muscle.
c Portion of the masseter muscle.
d External pterygoid muscle.
e Portion of the internal pterygoid muscle.

1 Fifth nerve.
2 First trunk of the fifth.
3 Second trunk of the fifth.
4 Third trunk of the fifth.
5 Fourth trunk, arising from the part of the Gasserian ganglion near the origin of the second trunk; it corresponds with the buccal nerve: it receives fibrils of the anterior portion of the fifth, and gives branches to the pterygoid muscles.
6 A branch to the fourth trunk from the anterior portion of the fifth.
7 Deep temporal branch of the third trunk of this preparation to the temporal muscle.
8 A branch of the third trunk of this preparation, giving a filament to the temporal muscle, and then proceeding to terminate in the masseter.
9 Branches of the third trunk of this preparation, forming the gustatory and inferior dental nerves.

FIGURE VI.

This figure is taken from the same preparation as the preceding, but the fifth is turned so as to show more particularly the connexion of the fourth trunk with the anterior portion of the nerve.

1 Fifth nerve.
2 Origin of the fourth trunk.
3 Part of the anterior portion of the fifth nerve joining the fourth trunk.

FIGURE VII.

THIS figure shows the communication between the branch of the infra-orbital nerve, and that of the nasal near the ala of the nose.

1 Infra-orbital nerve.
2 Continuation of the branch of the nasal, seen in 2 figure 8, to join a branch of the infra-orbital nerve.

FIGURE VIII.

THIS figure is taken from the other side of the same preparation as Figure VII. It represents the spheno-palatine ganglion with its attachment to the second trunk of the fifth; a branch passing from this ganglion to the surface of the Schneiderian membrane that adhered to the septum, and then through the incisive foramen to unite with a branch of the palatine nerve near the root of the front incisive tooth. Other branches are seen terminating on the part of the Schneiderian membrane covering the turbinated bones, and some passing through foramina, at the junction of the palatine bone with the pterygoid processes of the sphenoid, to the soft palate, but the principal one taking its course through the posterior palatine foramen to terminate on the roof of the mouth.

a Schneiderian membrane covering the septum.
b Schneiderian membrane covering the turbinated bones.
c Part of the soft palate.

1 One division of the nasal nerve of the first trunk of the fifth, passing on the Schneiderian membrane of the septum.
2 The other division of the nasal nerve of the first trunk of the fifth, passing at the posterior part of the nasal bone to the ala of the nose, to communicate with the branch 2 figure 7, from the infra-orbital nerve.
3 Second trunk of the fifth.
4 Spheno-palatine ganglion.
5 A branch of the spheno-palatine ganglion, sending filaments to the membrane lining the posterior part of the orbit, to the Schneiderian membrane on the turbinated bones, to that on the septum, and a principal one downward on this part, to pass through the incisive foramen to the roof of the mouth, to join a branch of the palatine nerve near the front incisive tooth.
6 Branches of the palatine nerves to the Schneiderian membrane covering the turbinated bones, and the rest of the same surface of the nose.
7 A palatine branch passing to the soft palate.
8 Principal palatine nerve, passing through the palatine foramen to divide into branches to terminate on the roof of the mouth, and send one forward to communicate, near the front incisive tooth, with the one sent through the incisive foramen.

PLATE XV.

Fig. 1.

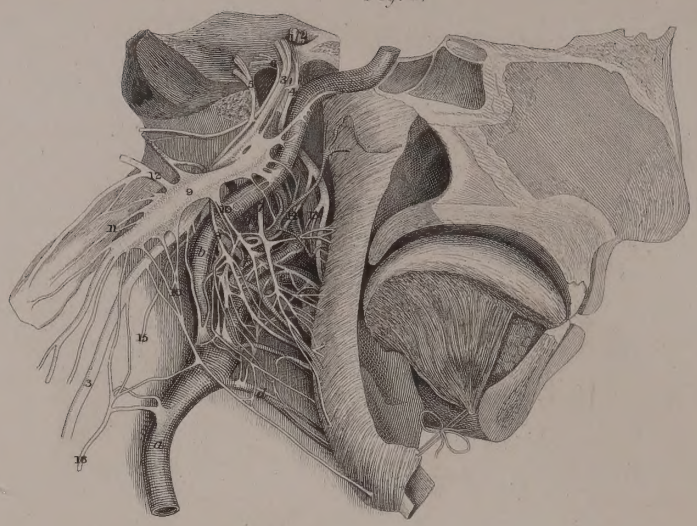


Fig. 4.

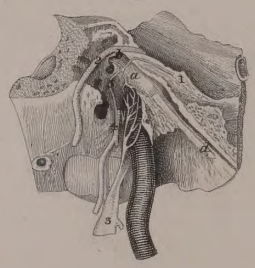
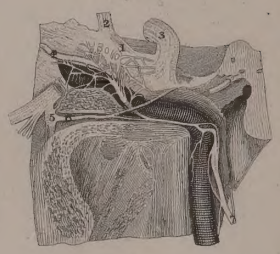


Fig. 5.



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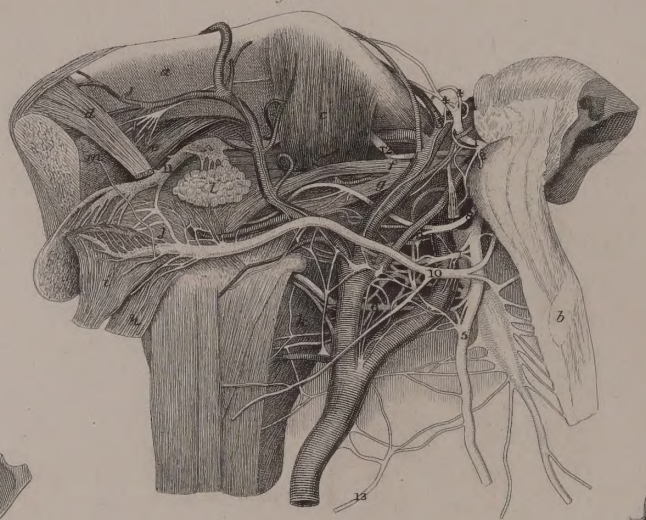


Fig. 6.

Fig. 7.

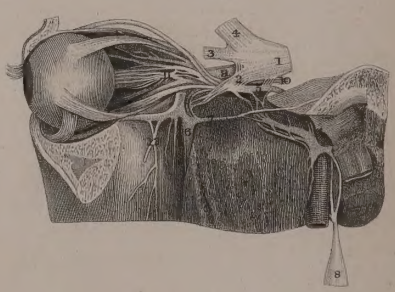
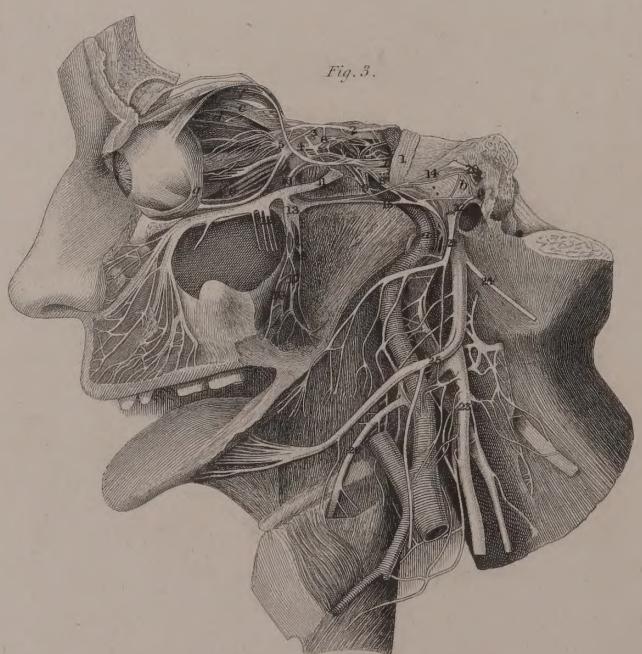


Fig. 3.



Drawn by West.

Engraved by Finden.

PLATE XV.

FIGURE I.

This figure is taken from the inner or median side of the preparation, made from a vertical section of the head and neck. The pharynx has been drawn towards the chin for the purpose of expanding the nerves. The origin of the glosso-pharyngeal nerve is seen terminating in a ganglion, and sending a branch to the upper part of the first cervical ganglion of the sympathetic nerve. Branches of the left trunk of the par vagum, the accessory, the ninth, and the sympathetic, are seen joining, and forming the pharyngeal plexus. At the posterior part, branches from the sympathetic may be traced to a cluster of absorbent glands, and some cellular membrane.

a Common carotid artery.
b Internal carotid artery.
c External carotid artery.
d Superior thyroideal artery.
e Trunk of the facial and lingual arteries.
f Pharyngeal artery.
g Occipital artery.

1 Proper auditory nerve.
2 Facial nerve.
3 Left trunk of the par vagum.
4 Glosso-pharyngeal nerve.
5 Ninth nerve.
6 Accessory nerve.
7 A branch of the accessory, that has been connected with the left trunk of the par vagum, to the pharyngeal plexus.
8 Superior laryngeal nerve.
9 First cervical ganglion of the sympathetic nerve.
10 Branches of the sympathetic nerve to the pharyngeal plexus.
11 Branches of the sympathetic nerve to the absorbent glands.
12 A branch of the sympathetic to the first cervical nerve.
13 Branches of the glosso-pharyngeal nerve to the stylo-pharyngeal muscle.
14 A branch of the glosso-pharyngeal nerve to the pharyngeal plexus.
15 Descending branch of the ninth.
16 Superficial cardiac nerve.

FIGURE II.

This is taken from the exterior surface of the same preparation as Figure I. The inferior margin of the lower jaw has been turned upwards, for the purpose of showing the pharyngeal plexus; the branch of the facial nerve passing on the external carotid artery, and joining this plexus; the branch of the inferior dental nerve of the third trunk of the fifth, descending in a groove on the inner side of the lower jaw, and terminating in the mylo-hyoideal muscle, and the maxillary portion of the digastric.

a Inferior edge of the lower jaw turned upwards.
b Absorbent glands.
c Internal pterygoid muscle.
d Maxillary portion of the digastric muscle.

e Mylo-hyoideal muscle.
f Stylo-glossal muscle.
g Stylo-pharyngeal muscle.
h Genio-hyoideal muscle.
i Genio-hyo-glossal muscle.
j Hyo-glossal muscle.
k Pharynx.
l Portion of the submaxillary gland.
m Portion of the sublingual gland.

1 Facial nerve.
2 A branch of the facial nerve to the stylo-hyoideal and digastric muscles.
3 A branch of the facial nerve to pass along the external carotid artery to the pharyngeal plexus.
4 Branches of the facial nerve to the face &c.
5 Left trunk of the par vagum.
6 Superior laryngeal nerve.
7 A branch of the accessory that has been connected with the left trunk of the par vagum to the pharyngeal plexus.
8 Glosso-pharyngeal nerve.
9 A branch of the glosso-pharyngeal nerve to the pharyngeal plexus.
10 Ninth nerve, giving off the descending branch, and then distributing branches to the thyro-hyoideal, genio-hyoideal, hyo-glossal, genio-hyo-glossal, stylo-glossal, lingual, and the other muscular structure of the tongue, and a branch to the sublingual gland.
11 Gustatory nerve, giving branches to the submaxillary and sublingual glands, and the membrane lining the mouth, communicating with the ninth, and then dividing into branches, which pass through the muscular fibres to terminate in the papillæ on the anterior portion of the surface of the tongue.
12 Inferior dental nerve.
13 Superficial cardiac nerve.

FIGURE III.

After making a perpendicular section of the head, a great part of the vertex and the outer side of the cranium and orbit was removed, as well as the orbital plate of the frontal bone, and a portion of the sphenoid; and thus the following nerves were exposed. The lenticular ganglion and ciliary nerves; the sixth sending filaments upwards on the internal carotid artery, and forming the plexus on the third nerve with filaments from the Gasserian ganglion, the nasal branch of the first trunk of the fifth, and the sixth, and thus producing an indirect communication with the lenticular ganglion; branches of the sixth passing downwards in an anterior and posterior division, receiving the inferior branch of the Vidian nerve, and uniting soon after their exit from the carotic canal; the glosso-pharyngeal nerve giving off the tympanine; the second trunk of the fifth, communicating with the spheno-palatine ganglion, and giving off the dental nerves before it reaches the face to become the infra-orbital nerve; the spheno-palatine ganglion sending off the Vidian, which divides into two branches, the superior is seen to join the facial nerve, the inferior the branches of the sixth on the internal carotid artery; a branch from the pheno-palatine ganglion to join the plexus on the part of the internal carotid ascending through the cavernous sinus: also the palatine nerves.

a Internal carotid artery.
b Part of the petrous portion of the temporal bone forming the inner surface of the tympanum.
c Levator muscle of the eye.
d Levator muscle of the upper eye-lid.
e Depressor muscle of the eye.
f Abductor muscle of the eye.
g Inferior oblique muscle of the eye.

1 Part of the Gasserian ganglion.
2 Nasal branch of the first trunk of the fifth.
3 Small division of the third nerve.
4 Large division of the third nerve.
5 Lenticular ganglion, giving off the ciliary nerve.
6 Plexus on the third nerve, formed by filaments from the sixth, the nasal branch of the fifth, and a branch from the spheno-palatine ganglion.
7 Sixth nerve, sending filaments upwards to the plexus

on the third nerve, and the portion of the internal carotid artery ascending through the cavernous sinus.

8 Filaments of the sixth, descending anteriorly on the internal carotid artery to the first cervical ganglion of the sympathetic nerve.

9 Filaments of the sixth, descending posteriorly on the internal carotid artery to the first cervical ganglion of the sympathetic nerve.

10 First cervical ganglion of the sympathetic nerve.

11 Second trunk of the fifth.

12 Superior dental branches cut short.

13 Spheno-palatine ganglion.

14 Superior branch of the Vidian nerve.

15 Inferior branch of the Vidian nerve.

16 A branch from the spheno-palatine ganglion, ascending to the plexus on the carotid artery

17 Branches from the spheno-palatine ganglion passing to the soft palate.

18 A branch from the spheno-palatine ganglion passing to the posterior part of the soft palate, and the insertion of the levator muscle.

19 Palatine nerves, forming the principal portion of the branches arising from the spheno-palatine ganglion, passing through the palatine foramen to the roof of the mouth.

20 Facial nerve.

21 Glosso-pharyngeal nerve.

22 Tympanine nerve of the glosso-pharyngeal.

23 Left trunk of the par vagum.

24 Accessory nerve.

25 Ninth nerve.

26 Superior laryngeal nerve.

FIGURE IV.

This figure shows the tympanine nerve of the glosso-pharyngeal, and its minute ramifications on the part of the petrous portion of the temporal bone, forming the inner surface of the tympanum; one filament may be seen passing towards the Gasserian ganglion, a second towards the round foramen, and the third communicating with the sympathetic nerve on the internal carotid artery.

a Part of the petrous portion of the temporal bone, forming the inner surface of the tympanum.

b Oval fenestra.

c Round fenestra.

d Eustachian tube.

1 Gasserian ganglion.

2 Facial nerve.

3 First cervical ganglion of the sympathetic nerve.

4 Glosso-pharyngeal nerve.

5 Tympanine nerve of the glosso-pharyngeal.

FIGURE V.

This figure shows the connexion between the Gasserian ganglion, the inferior branch of the Vidian nerve, the sixth, and an ascending branch from the spheno-palatine ganglion.

1 Gasserian ganglion.

2 Second trunk of the fifth nerve.

3 Third trunk of the fifth nerve.

4 Sixth nerve.

5 Spheno-palatine ganglion.

6 Vidian nerve.

7 Sympathetic nerve.

FIGURE VI.

This figure shows the connexion of the fourth with the first trunk of the fifth, and also the filament of the fourth joining one from the supra-orbital, and forming the lachrymal nerve; the malar nerve of the second trunk of the fifth dividing into a temporal and malar branch; the temporal dividing again,

and sending one through a small canal formed at the junction between the orbital process of the malar bone and the external angular process of the frontal, and then through some fibres of the temporal muscle, and communicating with the temporal branches of the facial nerve, passing through apertures in the temporal fascia; the other going forward to the lachrymal gland communicating with the lachrymal nerve, and terminating in the conjunctive membrane and skin of the upper eye-lid; the malar branch proceeding nearly at the bottom of the exterior side of the orbit, and going through a foramen in the malar bone, to communicate with the facial nerve, and terminate on the skin.

a Nasal process of the frontal bone.
b Ethmoid bone.
c Petrous portion of the temporal bone.
d Temporal muscle.
e Inner surface of the skin of the upper eye-lid.
f Lachrymal gland.

1 Fifth nerve.
2 First trunk of the fifth.
3 Supra-orbital nerve of the first trunk of the fifth.
4 Nasal nerve of the first trunk of the fifth.
5 Second trunk of the fifth.
6 Malar nerve of the second trunk of the fifth.
7 Malar branch of the malar nerve, to pass through the foramen in the malar bone to the cheek.
8 Temporal branch of the malar nerve, communicating with the lachrymal nerve and one of the temporal branches of the facial nerve.
9 Temporal branches of the facial nerve.
10 Lachrymal nerve proceeding from the supra-orbital and fourth.
11 Third trunk of the fifth nerve.
12 Deep temporal nerve of the third trunk of the fifth.
13 A filament of the deep temporal nerve, to pass through fibres of the temporal muscle to communicate with a branch of the facial nerve.
14 A branch of the third trunk of the fifth to the masseter muscle.
15 Superficial temporal nerve of the third trunk of the fifth.
16 Buccal nerve of the third trunk of the fifth.
17 Optic nerve.
18 Third nerve.
19 Fourth nerve.

FIGURE VII.

THIS figure shows the connexion between the Gasserian ganglion, the sixth, and an ascending branch from the spheno-palatine ganglion; it shows also the Vidian nerve, and the ascending branches from the first cervical ganglion of the sympathetic.

1 Gasserian ganglion.
2 First trunk of the fifth.
3 Second trunk of the fifth.
4 Third trunk of the fifth.
5 Sixth nerve.
6 Spheno-palatine ganglion.
7 Vidian nerve.
8 First cervical ganglion of the sympathetic nerve.
9 Third nerve.
10 Fourth nerve.
11 Lenticular ganglion.
12 First dental nerve.

Fig. 1.

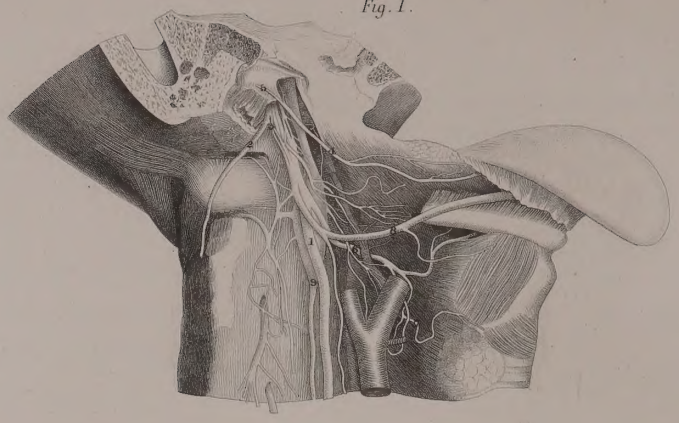
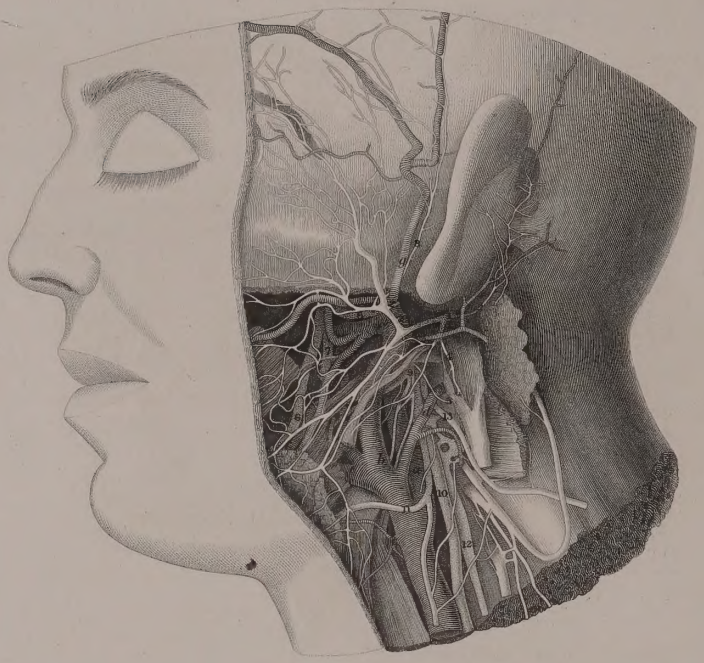


Fig. 4.

Fig. 2.



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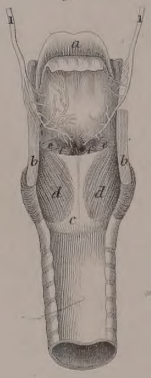


Fig. 6.

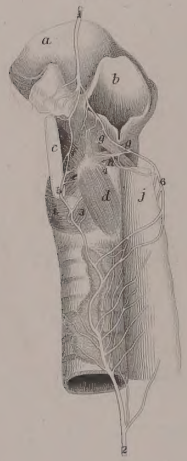


Fig. 3.

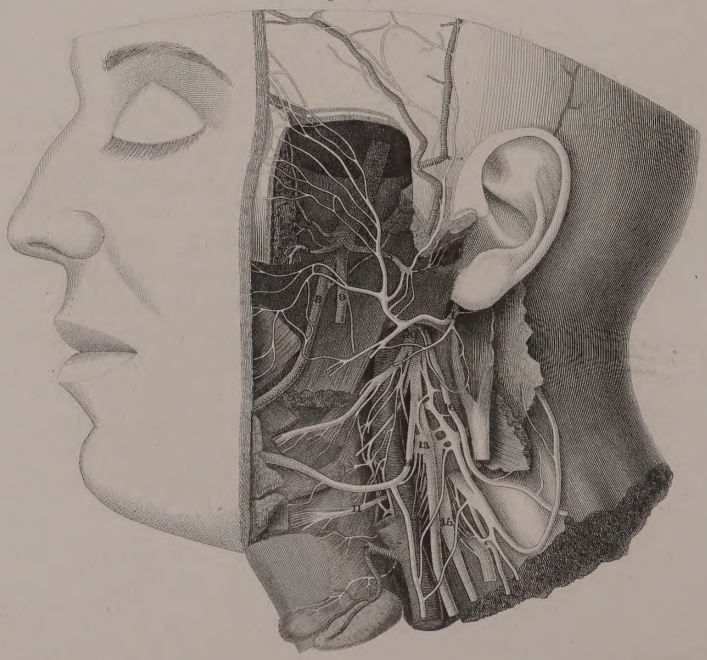


Fig. 7.

Drawn by West.

Engraved by Finden.

PLATE XVI.

FIGURE I.

This figure shows the branch usually considered to be derived from the accessory for forming part of the pharyngeal plexus; it passes from the accessory, and becomes connected with the trunk of the par vagum, and near the point of connexion a branch is given off, but this cannot now be looked upon as belonging altogether to the accessory. This figure also shows the connexion between the ninth, the trunk of the par vagum, and sympathetic, after the removal of the surrounding condensed cellular membrane.

1 Trunk of the par vagum.
2 Accessory.
3 A branch from the accessroy to the pharyngeal plexus, after its connexion with the trunk of the par vagum.
4 Glosso-pharyngeal nerve.
5 Tympanine branch of the glosso-pharyngeal nerve.
6 Superior laryngeal nerve.
7 External laryngeal nerve, giving a branch to the crico-thyroideal muscle.
8 Ninth nerve.
9 Sympathetic nerve.

FIGURE II.

The greatest part of the lower jaw was removed, after the facial nerve had been dissected. The figure shows the facial nerve generally, but more particularly the branch passing at the back of the ear to the retrahent and attollent muscles; it shows also the branch giving filaments to the digastric and stylo-hyoideal muscles, and sending one from the midst of the digastric muscle to join the glosso-pharyngeal nerve, and one to pass down on the external carotid artery, to join the branch of the sympathetic communicating with the pharyngeal plexus.

a Internal carotid artery.
b External carotid artery.
c Superior thyroideal artery.
d Occipital artery.
e Trunk of the external maxillary and lingual arteries.
f Internal maxillary artery.
g Temporal artery.

1 Facial nerve.
2 Branches of the facial nerve to communicate with the superficial temporal branch of the third trunk of the fifth.
3 A branch of the facial nerve given to the retrahent and attollent muscles of the ear.
4 Digastric branch of the facial nerve.
5 A branch of the digastric branch of the facial, joining the glosso-pharyngeal nerve.
6 Gustatory nerve.
7 Inferior dental nerve.
8 Superficial temporal nerve of the third trunk of the fifth.

9 Glosso-pharyngeal nerve.
10 Trunk of the par vagum.
11 Ninth nerve.
12 Sympathetic nerve.
13 Accessory nerve.

FIGURE III.

THIS figure was taken from the same preparation as the preceding, after some farther dissection; the external carotid artery and its branches have been removed for exposing the third trunk of the fifth, and the chord of the tympanum united with the gustatory nerve; also the communication between the superficial temporal, and the facial, and the branch of the superficial temporal given to the membrane lining the external auditory meatus; also the branches of the glosso-pharyngeal nerve terminating near the epiglottis.

1 Facial nerve.
2 Third trunk of the fifth.
3 Deep temporal branches of the third trunk of the fifth to the temporal muscle.
4 A branch of the third trunk of the fifth to the masseter muscle.
5 Superficial temporal nerve of the third trunk of the fifth.
6 A branch of the superficial temporal nerve to the membrane lining the external auditory meatus.
7 Chord of the tympanum.
8 Gustatory nerve.
9 Inferior dental nerve.
10 Glosso-pharyngeal nerve.
11 Superior laryngeal nerve.
12 A branch of the external laryngeal nerve.
13 Trunk of the par vagum.
14 Ninth nerve.
15 Sympathetic nerve.
16 Accessory nerve.

FIGURE IV.

PART of the thyroid cartilage has been cut away; the membrane lining the pharynx has been separated and turned aside, for the purpose of showing the connexions and terminations of the superior laryngeal and recurrent nerves.

a Membrane placed between the larynx and pharynx.
b Epiglottis.
c Thyroid cartilage.
d Posterior crico-arytenoid muscle.
e Lateral crico-arytenoid muscle.
f Oblique arytenoid muscle.

1 Superior laryngeal nerve, giving filaments to the membrane connected with that covering the epiglottis, the glottis, and the back of the pharynx, and sending a branch downwards to communicate with one from the recurrent.
2 Recurrent nerve.
3 A branch of the recurrent nerve, passing upwards and terminating in the muscles of the glottis.

FIGURE V.

THE transverse and oblique arytenoid muscles have been divided, for allowing the branch of the superior laryngeal nerve to be traced to the membrane placed between the superior extremities of the arytenoid cartilages.

a Epiglottis.
b Thyroid cartilage cut.
c Cricoid cartilage.
d Posterior crico-arytenoid muscle.
e Oblique arytenoid muscle cut.
f Transverse arytenoid muscle cut.

1 Superior laryngeal nerve.
2 A branch of the superior laryngeal nerve, passing to the membrane between the superior extremities of the arytenoid cartilages.

FIGURE VI.

PART of the thyroid cartilage has been removed for showing the terminations of the superior laryngeal and recurrent nerves.

a Portion of the tongue.

b Epiglottis.
c Thyroid cartilage.
d Posterior crico-arytenoid muscle.
e Lateral crico-arytenoid muscle.
f Thyro-arytenoid muscle.
g Oblique arytenoid muscle.
h Transverse arytenoid muscle.
i Crico-thyroideal muscle.
j Membrane placed between the larynx and pharynx.

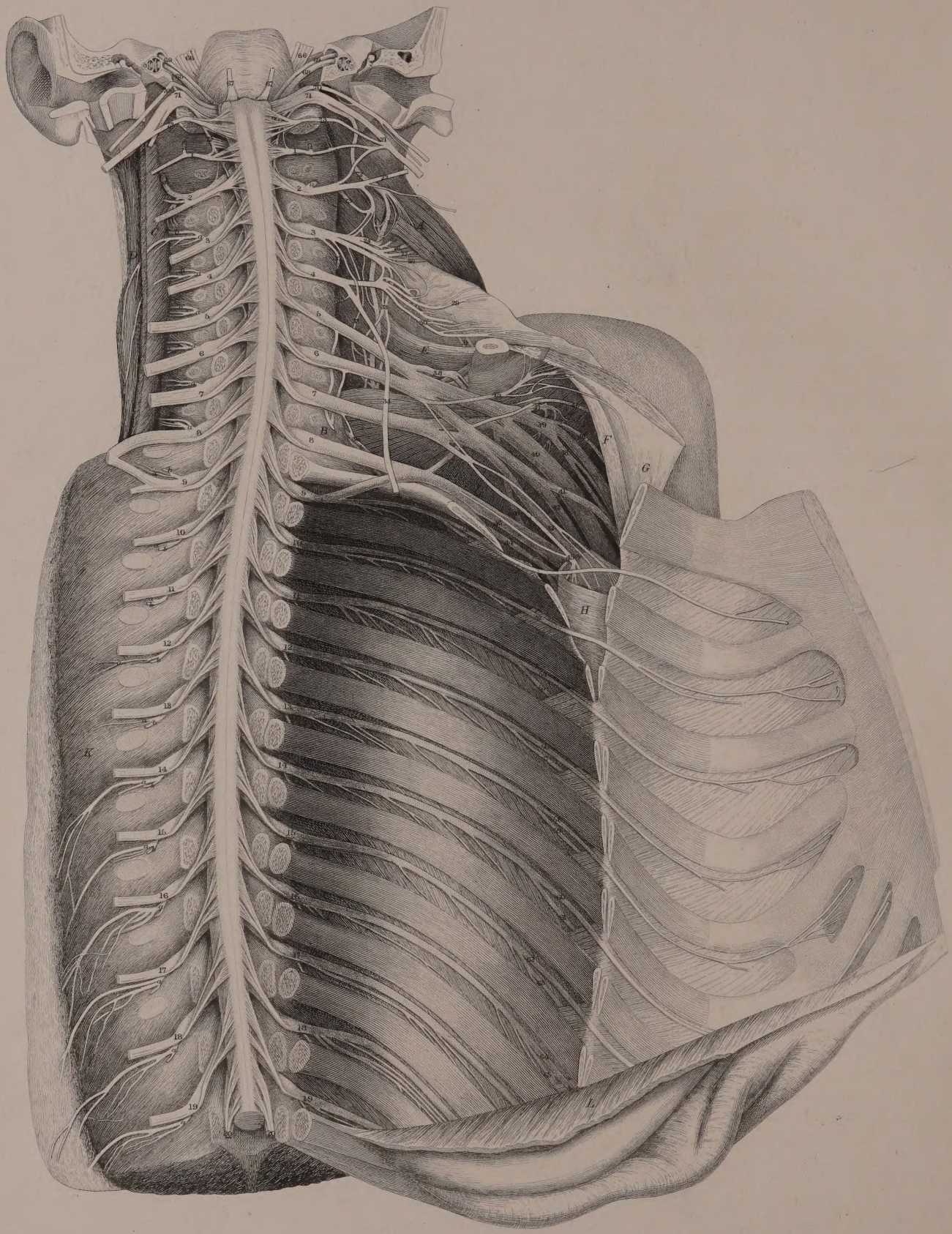
1 Superior laryngeal nerve.
2 Recurrent nerve.
3 Filaments of the recurrent nerve to the posterior crico-arytenoid muscle.
4 A branch of the recurrent nerve passing between the posterior crico-arytenoid muscle and the arytenoid cartilage, to terminate in the oblique and transverse arytenoid muscles.
5 Continuation of the recurrent nerve, giving filaments to the lateral crico-arytenoid and the thyro-arytenoid muscles, and communicating with a branch of the superior laryngeal nerve.
6 Continuation of the recurrent nerve to communicate with a branch of the superior laryngeal nerve.

FIGURE VII.

THIS figure was taken from the opposite side of the same preparation as the preceding.

a Portion of the tongue.
b Epiglottis.
c Thyroid cartilage.
d Posterior crico-arytenoid muscle, divided for showing the branch of the recurrent passing to the oblique and transverse arytenoid muscles.
e Lateral crico-arytenoid muscle.
f Thyro-arytenoid muscle.
g Oblique arytenoid muscle.
h Transverse arytenoid muscle.
i Crico-thyroideal muscle.
j Membrane placed between the larynx and pharynx.

1 Superior laryngeal nerve.
2 Branches of the superior laryngeal nerve to the membrane connected with that covering the epiglottis.
3 A branch of the superior laryngeal nerve to the membrane placed between the superior extremities of the arytenoid cartilages.
4 Recurrent nerve.
5 Branches of the recurrent nerve given to the membrane placed between the larynx and pharynx.
6 A branch of the recurrent nerve to communicate with a branch of the superior laryngeal nerve.
7 A branch of the recurrent nerve to the posterior crico-arytenoid muscle.
8 A branch of the recurrent nerve to the lateral crico-arytenoid and the crico-thyroideal muscles.
9 A branch giving filaments to the posterior crico-arytenoid, and passing between this muscle and the arytenoid cartilage, to terminate in the oblique and transverse arytenoid muscles.



Drawn by West.

Engraved by Finden.

PLATE XVII.

THE sternum has been divided perpendicularly through the middle, and the ribs of the left side near their angles, so as to allow the sternum to be thrown back; the ribs of the right side and the bodies of the vertebræ have been entirely removed, as well as the heads of the ribs on the left side: the anterior part of the skull has been removed almost close to the external auditory meatus; the greatest part of the clavicle has been taken away, and the shoulder thrown back, so as to allow the cervical nerves to be traced to the axillary plexus; the sterno-cleido-mastoid muscle has been turned over, so that the accessory, as well as its connexions with the cervical nerves, may be seen: all the loose membranes have been removed from the spinal canal, and also the denticulated ligament: the diaphragm has been drawn down for exposing as much as possible the dorsal nerves.

A Sterno-cleido-mastoid muscle.
B Part of the middle scalenus muscle.
C Complex muscle.
D Splenius muscle.
E Trapezius muscle.
F Coraco-brachial muscle.
G Great pectoral muscle.
H Small pectoral muscle.
J Sub-scapular muscle.
K Sacro-lumbar muscle.
L Diaphragm.

1 Sub-occipital nerve. a, its posterior trunk.

2 First cervical nerve. a, its posterior trunk continued through the complex muscle, and giving filaments to this, the splenius of the head, and the trachelo-mastoid, and communicating with the posterior of the second to terminate on the scalp of the occiput.

3 Second cervical nerve. a, its posterior trunk, giving a branch to the complex, splenius, and transverse muscles, and sending the branch b, to pierce the complex, splenius, and trapezius muscles, to terminate on the skin.

4 Third cervical nerve. a, its posterior trunk, giving filaments to the semi-spinal and other small muscles, and sending the branch b, between the semi-spinal and complex to give filaments to the splenius, and pierce this and the trapezius, to terminate on the skin.

5 Fourth cervical nerve. a, its posterior trunk, giving filaments to the semi-spinal and other small muscles, and then passing between the semi-spinal and complex, and piercing the splenius and trapezius to terminate on the skin.

6 Fifth cervical nerve. a, its posterior trunk, giving filaments to the semi-spinal and other small muscles, and terminating on the complex.

7 Sixth cervical nerve. a, its posterior trunk, giving filaments to the semi-spinal and other small muscles, and terminating on the complex.

8 Seventh cervical nerve. a, its posterior trunk giving filaments to the semi-spinal and other small muscles, and then terminating on the complex.

9 First dorsal nerve. a, a branch of the posterior trunk, terminating in the sacro-lumbar muscles; b, after giving filaments to the small muscles

and the sacro-lumbar, passes through the trapezius to the skin.

10 Second dorsal nerve. a, a branch of its posterior trunk, terminating in the sacro-lumbar muscle ; b, after giving filaments to the small muscles, the sacro-lumbar, and the longest muscle of the back, pierces the trapezius to terminate on the skin.

11 Third dorsal nerve. a, a branch of its posterior trunk, terminating in the sacro-lumbar and the longest muscle of the back ; b, another branch after giving filaments to the small muscles and the sacro-lumbar, pierces the trapezius to terminate on the skin.

12 Fourth dorsal nerve. a, a branch of its posterior trunk terminating in the sacro-lumbar and the longest muscle of the back ; b, a branch giving filaments to the small muscles and the sacro-lumbar, and piercing the trapezius to terminate on the skin.

13 Fifth dorsal nerve. a, a branch of its posterior trunk terminating in the sacro-lumbar and the longest muscle of the back ; b, a branch, after giving filaments to the small muscles and the sacro-lumbar, pierces the trapezius to terminate on the skin.

14 Sixth dorsal nerve. a, a branch of its posterior trunk giving filaments to the sacro-lumbar and the longest muscle of the back, and sending a branch to the skin ; b, a branch, after giving filaments to the small muscles and the sacro-lumbar, terminates in the skin.

15 Seventh dorsal nerve. a, its posterior trunk terminating in the sacro-lumbar and the longest muscle of the back ; b, after giving filaments to the small muscles, terminates in the sacro-lumbar.

16 Eighth dorsal nerve. a, after giving filaments to the small muscles, the sacro-lumbar, and the longest muscle of the back, pierces this and the trapezius to terminate on the skin.

17 Ninth dorsal nerve. a, its posterior trunk, giving filaments to the small muscles, the sacro-lumbar, and the longest muscle of the back, and piercing this and the tendon of the broadest muscle of the back to terminate on the skin.

18 Tenth dorsal nerve. a, its posterior trunk, giving filaments to the small muscles, the sacro-lumbar and the longest muscle of the back, and piercing this and the tendon of the broadest muscle of the back, to terminate on the skin.

19 Eleventh dorsal nerve. a, its posterior trunk, giving filaments to the small muscles, the sacro-lumbar, and the longest muscle of the back, and piercing this and the tendon of the broadest muscle of the back to terminate on the skin.

20 Origin of the twelfth dorsal nerve ; its continuation may be seen in 1 P. XVIII.

21 Union of the par vagum, ninth nerve, &c.

22 A branch of the first cervical nerve, that has communicated with the sympathetic and sub-occipital.

23 A branch of the junction of the first and second cervical nerves to the scalp at the back of the head.

24 A branch of the second cervical nerve sent to the skin near the mastoid process.

25 A branch from the second cervical nerve to the skin at the back of the ear.

26 A branch from the second cervical nerve sending a filament to the ear, and communicating with branches of the facial nerve in the parotid gland, and sending filaments to the skin of the face.

27 A branch from the second cervical nerve to communicate with branches of the facial nerve, and terminate on the cutaneous muscle and the skin near the angle of the jaw.

28 A branch from the second cervical nerve to terminate on the skin on the front of the neck.

29 A branch from the union of the second and third cervical nerves to terminate on the skin near the anterior part of the clavicle.

30 A branch from the union of the second and third cervical nerves, to terminate on the skin near the posterior part of the clavicle.

31 Branches from the union of the second and third cervical nerves, to terminate on the skin near the acromion.

32 Filaments from the union between the first and second cervical nerves, to join the accessory in the sterno-cleido-mastoid muscle.

33 Branches from the second and third cervical nerves, joining the accessory behind the trapezius muscle.

34 Phrenic nerve.

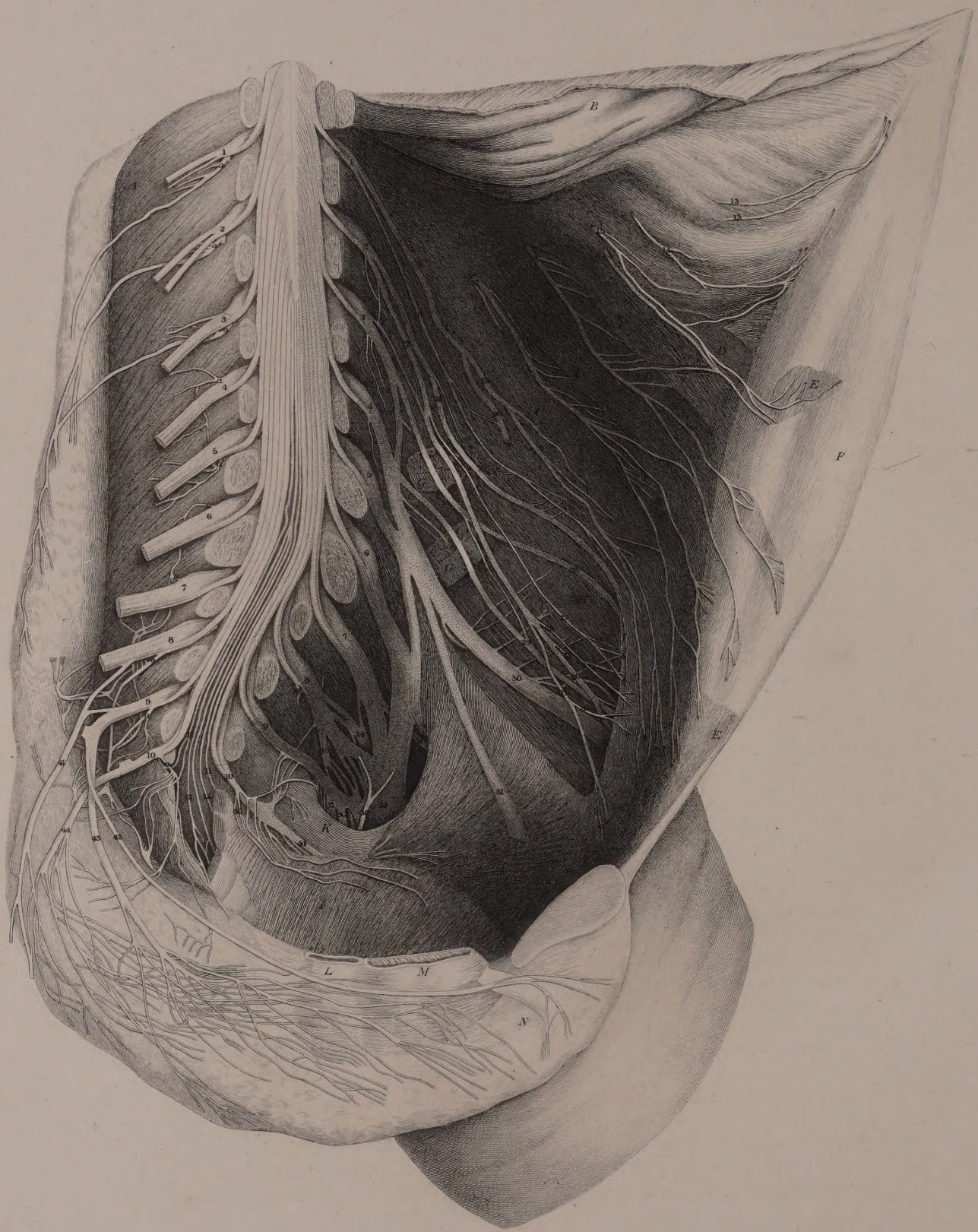
35 A branch of the phrenic nerve passing to the posterior scalenus muscle.

36 A nerve formed by a branch from the fourth, fifth and sixth cervical nerves, to the great serrated muscle.

37 A branch from the second cervical nerve to the levator muscle of the scapula.

38 Superior scapular nerve.

39 Circumflex nerve.
40 Spiral nerve.
41 Musculo-cutaneous nerve.
42 The two portions forming the origin of the median nerve.
43 A thick chord, giving a portion to the median and then terminating in the ulnar nerve.
44 Internal cutaneous nerve.
45 Thoracic nerves to the great and small pectoral muscles.
46 A branch from the union of the fifth and sixth cervical nerves to the coraco-brachial muscle.
47 A nerve connected with the spiral to terminate in the sub-scapular muscle.
48 Nerves connected with the circumflex to terminate in the small and large teres muscles.
49 A nerve connected with the spiral to terminate in the broadest muscle of the back.
50 Internal branch of the first dorsal nerve, giving filaments to the intercostal muscles, then passing between the cartilages of the first and second ribs, giving a filament to the great pectoral muscle and terminating on the skin, after communicating with the branch of the third cervical nerve that has passed over the clavicle.
51 External branch of the first dorsal nerve passing between the first and second ribs ; in this preparation it is in the place of the smaller internal cutaneous nerve.
52 Internal branch of the second dorsal nerve, giving filaments to the intercostal muscles, and passing between the cartilages of the second and third ribs to the mamma and skin.
53 External branch of the second dorsal nerve.
54 Internal branch of the third dorsal nerve, giving filaments to the intercostal muscles and the triangular muscle of the sternum, then passing between the cartilages of the third and fourth ribs to give a filament to the great pectoral muscle, and terminate in the skin near the mamma.
55 External branch of the third dorsal nerve.
56 Internal branch of the fourth dorsal nerve, giving filaments to the intercostal muscles, and the triangular muscle of the sternum, then passing between the cartilages of the fourth and fifth ribs to the mamma and skin over this part.
57 External branch of the fourth dorsal nerve.
58 Internal branch of the fifth dorsal nerve, giving filaments to the intercostal muscles and the triangular muscle of the sternum, and passing between the cartilages of the fifth and sixth ribs, to terminate on the skin.
59 External branch of the fifth dorsal nerve.
60 Internal branch of the sixth dorsal nerve, giving filaments to the intercostal muscles, the diaphragm, the ligamentous covering of the cartilage of the sixth rib, and the triangular muscle of the sternum, then passing between the cartilages of the sixth and seventh ribs to terminate on the skin.
61 External branch of the sixth dorsal nerve.
62 Internal branch of the seventh dorsal nerve ; its continuation is seen in 13 P. XVIII.
63 External branch of the seventh dorsal nerve.
64 Internal branch of the eighth dorsal nerve ; its continuation is seen in 14 P. XVIII.
65 External branch of the eighth dorsal nerve.
66 Three-fold or fifth nerve.
67 Abducent oculo-muscular nerve.
68 Auditory nerve.
69 Facial nerve.
70 Glosso-pharyngeal nerve.
71 Par vagum.
72 Accessory nerve ; on the left side it may be seen entering the sterno-mastoid muscle, and communicating with two filaments from the union between the first and second cervical nerves, then passing downwards, and communicating with branches from the second and third cervical nerves, and terminating in the trapezius muscle.
73 Ninth nerve.



Drawn by West.

Engraved by Finden.

PLATE XVIII.

THE bone of the ilium, ischium, and pubes, the abdominal and the greatest part of the lumbar muscles, have been removed from the right side: the bladder, the uterus, and almost the whole of the rectum and the great psoas muscle, have been cut away; the bodies of the lumbar vertebræ, and the anterior part of the sacrum have been removed, so that the anterior trunks of the nerves may be traced on the left side, and the posterior on the right.

A Sacro-lumbar muscle.
B Diaphragm.
C Portions of the transverse muscle of the abdomen.
D Portions of the internal oblique muscle of the abdomen.
E Straight muscle of the abdomen.
F Posterior part of the sheath of the straight muscle of the abdomen.
G Portions of the great psoas muscle.
H Internal iliac muscle.
I Levator muscle of the anus.
J Poupart's ligament.
K Part of the superior sacro-sciatic ligament.
L Rectum.
M Vagina.
N Clitoris.

1 Twelfth dorsal nerve. a, its posterior trunk, giving branches to the small muscles and the sacro-lumbar, and then terminating in the skin.

2 First lumbar nerve. a, its posterior trunk, giving branches to the small muscles and the sacro-lumbar, and then terminating in the skin.

3 Second lumbar nerve. a, its posterior trunk, giving branches to the small muscles and the sacro-lumbar, and then terminating in the skin.

4 Third lumbar nerve. a, its posterior trunk, terminating in the small muscles and the sacro-lumbar.

5 Fourth lumbar nerve. a, its posterior trunk, terminating in the small muscles and the sacro-lumbar.

6 Fifth lumbar nerve. a, its posterior trunk, giving filaments to the small muscles and the sacro-lumbar, and then joining the posterior trunk of the first sacral nerve.

7 First sacral nerve. a, its posterior trunk, communicating with the posterior trunk of the fifth lumbar, giving filaments to the sacro-lumbar muscle, and then joining the posterior trunk of the second sacral, and giving filaments to the skin.

8 Second sacral nerve. a, its posterior trunk, giving filaments to the sacro-lumbar muscle, and joining the posterior trunk of the third sacral to terminate on the skin.

9 Third sacral nerve. a, its posterior trunk, communicating with the posterior of the second and fourth sacral, and giving filaments to the skin.

10 Fourth sacral nerve. a, its posterior trunk, communicating with the posterior trunk of the third and fifth sacral, and giving filaments to the skin.

11 Fifth sacral nerve, communicating with the posterior trunk of the third, fourth, and sixth sacral nerves, and terminating on the skin.

12 Sixth sacral nerve, communicating with the fifth, and terminating on the skin.

13 Continuations of the internal branch of the seventh dorsal nerve to give filaments to the straight muscle of the abdomen, and send others

through this and its sheath to terminate on the skin.

14 Continuation of the internal branch of the eighth dorsal nerve, giving filaments to the transverse muscle, and dividing into two branches; the superior giving filaments to the straight muscle, and then piercing this, to terminate on the skin; the inferior giving filaments to the transverse muscle, and communicating with the internal branch of the ninth, giving filaments to the straight muscle, and then piercing this to terminate on the skin.

15 Continuation of the internal branch of the ninth dorsal nerve, dividing into two branches, and passing forward between the transverse and internal oblique muscles, and to both of these giving filaments; the superior communicating with the internal branch of the eighth, the inferior with that of the tenth; both then entering the sheath, and after giving numerous filaments to the straight muscle, piercing this to terminate on the skin.

16 Continuation of the internal branch of the tenth dorsal nerve, passing between the transverse and internal oblique muscles, and to both of these giving filaments, then communicating with the internal branch of the ninth and eleventh, and after entering the sheath and giving filaments to the straight muscle, piercing this to terminate on the skin.

17 Continuation of the internal branch of the eleventh dorsal nerve, passing between the transverse and internal oblique muscles, and dividing into three branches, all of which give filaments to these muscles; the superior communicates with the internal branch of the tenth, and terminates in the straight muscle; the middle one also terminates in this muscle; the inferior communicates with the internal branch of the twelfth, and after giving filaments to the straight muscle, pierces this and terminates on the skin.

18 A long branch of the twelfth dorsal nerve, communicating with the external branch, and then passing downwards and forwards between the transverse and internal oblique muscles to divide into two branches, which enter the sheath of the straight muscle, one to terminate on this muscle, the other to pass through it to the skin.

19 Internal branch of the twelfth dorsal nerve, giving filaments to the transverse muscle, and being continued between this and the internal oblique, to both of these giving filaments; then communicating with the inferior branch of the internal of the eleventh, and passing obliquely downwards and forwards, to pierce the sheath of the straight muscle, give filaments to this, and terminate on the skin.

20 External branch of the twelfth dorsal nerve; its continuation is seen 12 P. XX.

21 A branch from the first lumbar nerve giving several filaments to the transverse muscle, and then piercing this and the internal oblique muscle near the anterior and superior spinous process of the ilium; its continuation will be seen in 1 P. XXIV.

22 A branch of the first lumbar nerve, forming the external spermatic, and dividing into the branches 23. 24. 25. 26. 27.

23 A branch of the external spermatic, giving a filament, a, to the transverse fascia, and then dividing into two, b, b, to pierce the transverse and internal oblique muscles; the continuations will be seen 2 P. XXIV.

24 A branch of the external spermatic passing through the origin of the transverse muscle near Poupart's ligament, giving a filament to the transverse fascia, and dividing into two branches to pass to the skin near the anterior and superior spinous process of the ilium, as may be seen 4 P. XXIV.

25 A small branch from the external spermatic to the transverse fascia.

26 A large branch from the external spermatic dividing into three to pass through fibres of Poupart's ligament to the skin; the continuations may be seen 5 P. XXIV.

27 A large branch of the external spermatic, which would properly itself be called the external spermatic; it gives two small branches, a, a, to the transverse fascia, and then passes through the internal and external rings to terminate in the skin about the pubes and the spermatic chord or round ligament, and communicate with a branch of 2; its continuation may be seen 3 P. XXIV.

28 External cutaneous branch from the second lumbar; its continuation may be seen 6 P. XXIV., to be distributed on the skin at the outer part of the thigh.

29 Internal cutaneous branch from the second lumbar; its continuation may be seen in 7 P. XXIV.

30 Anterior crural nerve.

31 Obturator nerve.

32 Sciatic nerve.

33 Branches from the union of the fourth and fifth lumbar nerves, and one from the first sacral, to unite and form the superior part of the gluteal plexus passing above the pyriform muscle to the middle and small gluteal muscles, and the tensor of the sheath of the thigh.

34. 35 Branches from the first, second, and third sacral nerves, together with others arising from the posterior part of the junction of these with the fourth and fifth lumbar nerves in the sciatic, to form the inferior part of the gluteal plexus and pass below the pyriform muscle, and give branches to the great gluteal muscle, and send the cutaneous branches to the skin about the tuberosity of the ischium, and one to unite with a branch of the internal pudendal nerve near the external parts, and to send others down the thigh to the skin, as in 8. 9. 10. 11 P. XXV.

36 Origin of the branch of the internal pudendal nerve from the third sacral, passing to the clitoris and parts adjacent.

37 Origin of the part of the internal pudendal nerve from the third sacral, giving filaments to the sphincter of the anus and vagina, and terminating on the skin about these parts.

38 A nerve from the fifth lumbar and second sacral, passing behind the superior sacro-sciatic ligament to the internal obturator muscle.

39 A branch from the second sacral nerve to the pyriform muscle.

40 Branches of the fourth sacral nerve given to the levator muscle of the anus and vagina.

41 A nerve from the second and third sacral nerves to the skin about the tuberosity of the ischium, &c.

42 A branch of the internal pudendal nerve to the clitoris and parts adjacent.

43 A branch of the internal pudendal nerve, giving filaments to the sphincters of the anus and vagina, and terminating on the skin about these parts.

44 Continuation of the fourth sacral nerve to terminate on the sphincter and skin about the anus, as in 3 P. XXV.

Fig. 1.

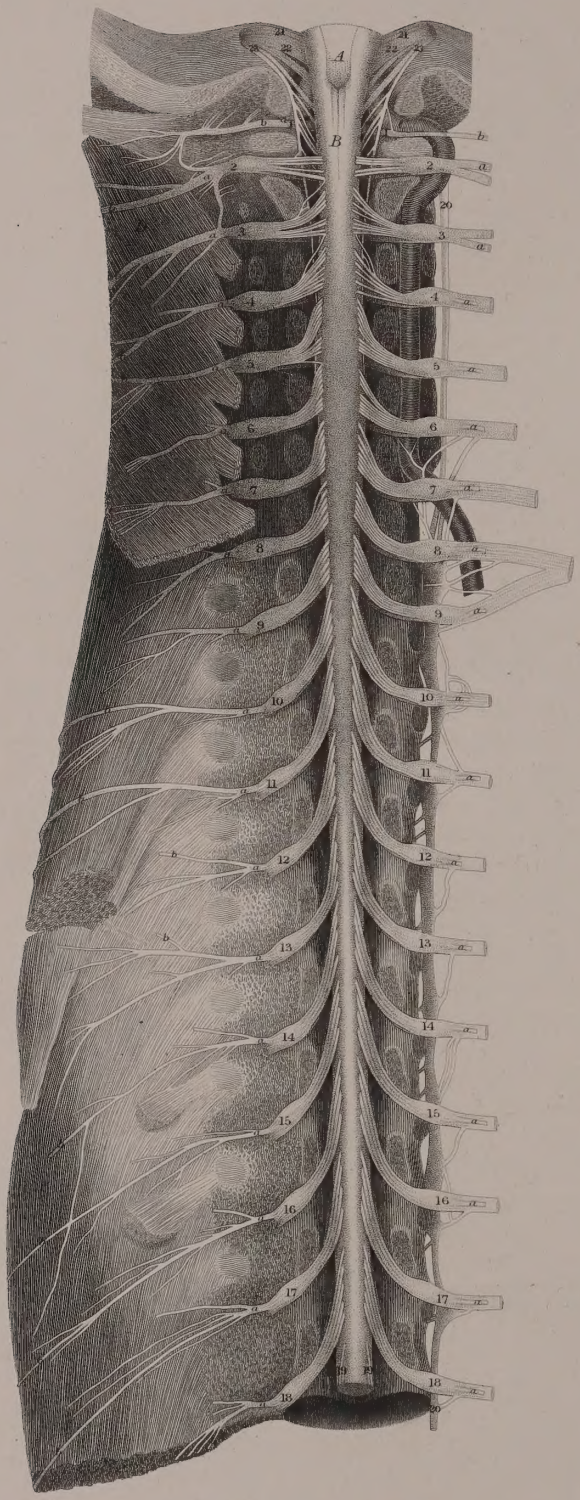
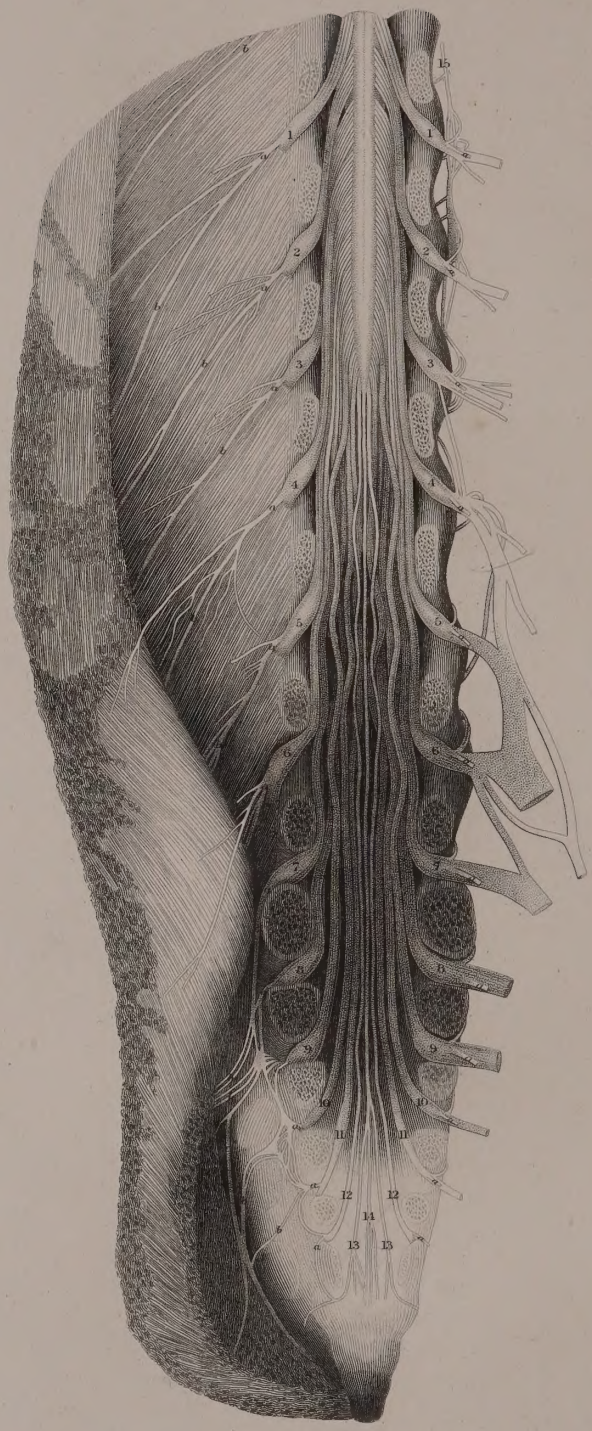


Fig. 2.



Drawn by West.

Engraved by Finden.

PLATE XIX.

THE top of the skull and a considerable portion of the occipital bone have been cut away; the posterior part of the ring of each vertebra terminating in the spinous process has been removed, as well as most of the transverse processes, also the posterior part of the sacrum. Some portions of muscle have been removed and the rest turned aside, and consequently some of the terminations of the posterior trunks have been destroyed; the loose membranes and the denticulated ligament have been removed from the spinal canal for the purpose of showing more distinctly the posterior bundle of each spinal nerve.

FIGURE I.

A Oblong medulla.
B Spinal chord.
C Vertebral artery.
D Complex muscle.

1 Sub-occipital nerve, chiefly formed of a bundle from the anterior portion of the spinal chord. a, its anterior trunk; b, its posterior trunk, giving filaments to the complex and the posterior straight and oblique muscles, and sending one down to communicate with the posterior trunk of the first cervical nerve.

2 First cervical nerve. a, its posterior trunk, communicating with that of the sub-occipital and second cervical, and giving filaments to the complex, splenius of the head, and the trachelo-mastoid muscle, and sending a branch, b, backwards to terminate on the scalp of the occiput.

3 Second cervical nerve. a, its posterior trunk, communicating with that of the first, and giving filaments to the complex, splenius, and transverse muscles, and sending the branch, b, to the skin, at the posterior part of the head and neck.

4 Third cervical nerve. a, its posterior trunk, giving filaments to the splenius and complex muscles, and sending a cutaneous branch, b, to the skin at the back of the neck.

5 Fourth cervical nerve. a, its posterior trunk, sending filaments to the muscles, and a cutaneous branch, b, to the skin at the back of the neck.

6 Fifth cervical nerve a, its posterior trunk, terminating in the muscles.

7 Sixth cervical nerve. a, its posterior trunk, terminating in the muscles,

8 Seventh cervical nerve. a, its posterior trunk, terminating in the muscles.

9 First dorsal nerve. a, its posterior trunk, terminating in the muscles.

10 Second dorsal nerve. a, its posterior trunk, giving filaments to the muscles, and sending a branch, b, forwards to terminate on the skin.

11 Third dorsal nerve. a, its posterior trunk, giving filaments to the muscles, and sending a branch, b, forwards to terminate on the skin.

12 Fourth dorsal nerve. a, its posterior trunk, giving filaments to the muscles, and sending a branch, b, forwards to terminate on the skin.

13 Fifth dorsal nerve. a, its posterior trunk, giving branches to the muscles, and sending a branch, b, forwards to terminate on the skin.

14 Sixth dorsal nerve. a, its posterior trunk, giving branches to the muscles, and sending a branch, b, forwards to terminate on the skin.

15 Seventh dorsal nerve. a, its posterior trunk, giving branches to the muscles, and sending a branch, b, forwards to terminate on the skin.

16 Eighth dorsal nerve. a, its posterior trunk, giving branches to the muscles, and sending a branch, b, forwards to terminate on the skin.

17 Ninth dorsal nerve. a, its posterior trunk, giving branches to the muscles, and sending a branch, b, forwards to terminate on the skin.

18 Tenth dorsal nerve. a, its posterior trunk, giving branches to the muscles, and sending a branch, b Fig. 2, forwards to terminate on the skin.

19 Eleventh dorsal nerve.

20 Sympathetic nerve.

21 Glosso-pharyngeal nerve.

22 Par vagum.

23 Accessory nerve.

FIGURE II.

1 Eleventh dorsal nerve. a, its posterior trunk, giving branches to the muscles, and sending a branch, b, forwards to terminate on the skin.

2 Twelfth dorsal nerve. a, its posterior trunk, giving branches to the muscles, and sending a branch, b, to the skin over the ilium.

3 First lumbar nerve. a, its posterior trunk, giving filaments to the muscles, and sending a branch, b, to the skin over the ilium.

4 Second lumbar nerve. a, its posterior trunk, giving filaments to the muscles, and sending a branch, b, to the skin over the posterior part of the spine of the ilium.

5 Third lumbar nerve. a, its posterior trunk, giving filaments to the muscles, and sending a branch, b, to the skin.

6 Fourth lumbar nerve. a, its posterior trunk, terminating in the lumbar muscles.

7 Fifth lumbar nerve. a, its posterior trunk, giving filaments to the muscles, and sending a branch to join the posterior trunk of the first sacral nerve.

8 First sacral nerve. a, its posterior trunk, uniting with one from the posterior trunks of the fifth lumbar and second sacral, and sending off several filaments, b, some to terminate in the muscles, and others to pass through these to the skin.

9 Second sacral nerve. a, its posterior trunk, communicating with that of the first and third, and sending a branch, b, through the muscles to the skin; and another, c, to join one from the union of the posterior trunk of the third and fourth.

10 Third sacral nerve. a, its posterior trunk, uniting with that of the second and fourth, and then sending a branch, b, to communicate with one from the second, and another from the junction of the third and fourth, and pass between the muscular fibres to terminate on the skin.

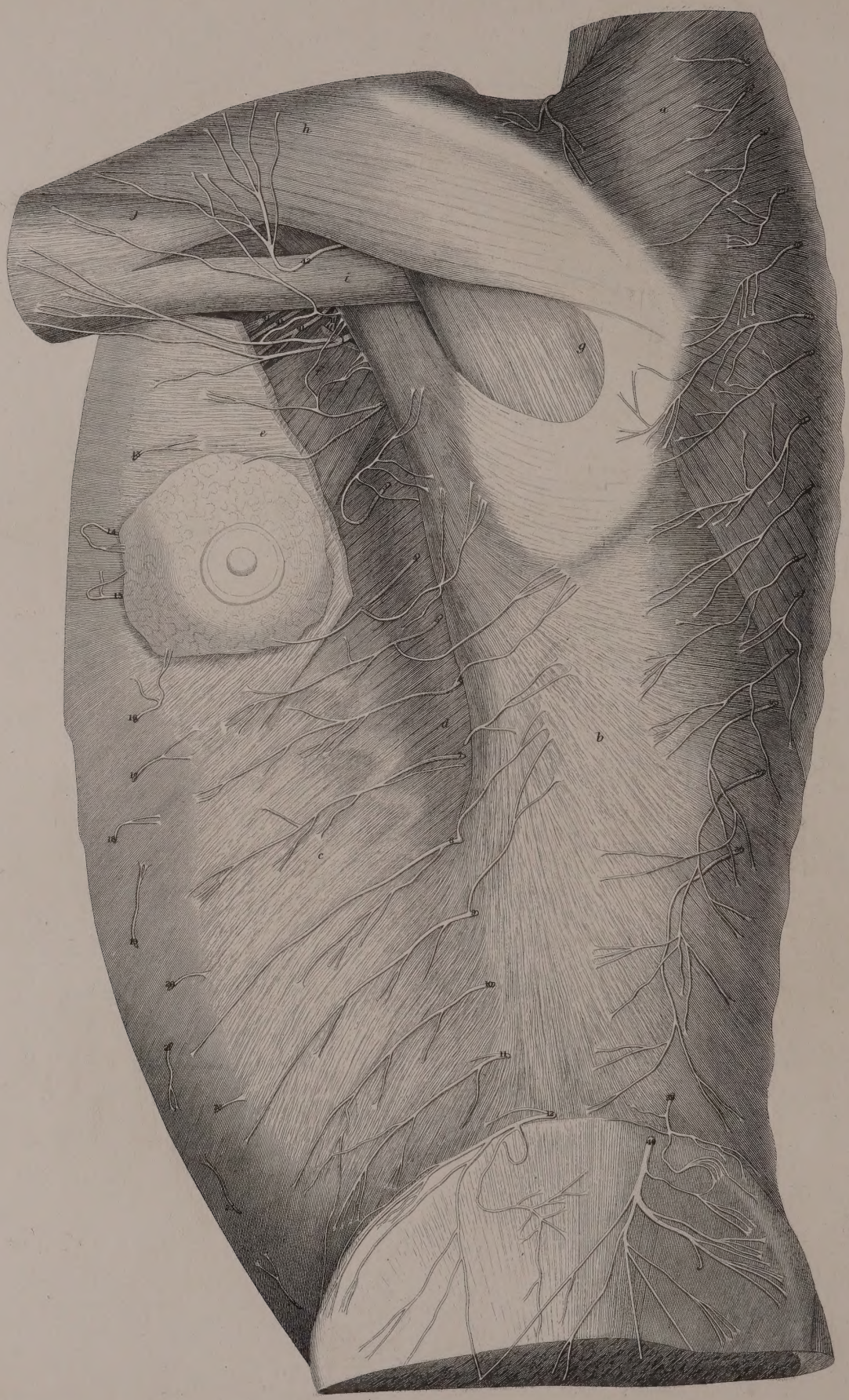
11 Fourth sacral nerve. a, its posterior trunk, communicating with the third and fifth, and sending the branch, b, down to join one sent from the junction of the second and third, to pass through the muscular fibres and fascia to the skin at the posterior part of the sacrum.

12 Fifth sacral nerve. a, its posterior trunk, communicating with that of the fourth and sixth.

13 Sixth sacral nerve, communicating with the posterior trunk of the fifth to terminate in the skin about the bone of the coccyx.

14 Filaments, terminating in the membrane lining the inferior part of the spinal canal.

15 Sympathetic nerve.



Drawn by West.

Engraved by Finden.

PLATE XX.

This plate is taken from the same preparation as XVII. and XVIII. placed on its side; the previous division of the ribs has allowed the sternum and the anterior portions of the ribs and abdominal muscles to be turned towards the back sufficiently for showing the superficial nerves distributed on these parts; all the skin and cellular membrane have been removed except the small portions for confining the nerves in their situations.

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a Trapezius muscle.
b Broadest muscle of the back.
c External oblique muscle.
d Great serrated muscle.
e Great pectoral muscle.
f Small pectoral muscle.
g Inferior spinous muscle.
h Deltoid muscle.
i Long head of the triceps muscle.
j Short or outer head of the triceps muscle.

1 External branch of the first dorsal nerve, terminating in the skin of the axilla, and the inner and posterior part of the arm.

2 External branch of the second dorsal nerve, terminating in the mamma, and the skin about the axilla, breast, and inner side of the arm.

3 External branch of the third dorsal nerve, terminating in the skin about the axilla and the inner edge of the scapula.

4 External branch of the fourth dorsal nerve, sending a branch forward to terminate in the mamma, and another backwards to the skin at the inner edge of the scapula.

5 External branch of the fifth dorsal nerve; it sends a branch forward to give a filament to the great serrated muscle at its plication with the external oblique, and terminate in the skin at the lateral and anterior part of the chest; it sends a branch backwards to the skin at the lateral and posterior part of the chest.

6 External branch of the sixth dorsal nerve; it sends a branch forwards to give a filament to the external oblique muscle, and terminate in the skin at the lateral and anterior part of the chest; it sends a branch backwards to terminate in the skin at the lateral and posterior part of the chest.

7 External branch of the seventh dorsal nerve; it sends a branch forward to give a filament to the external oblique muscle, and terminate on the skin at the anterior and lateral part of the chest: it sends a branch backwards to the skin of the side and back.

8 External branch of the eighth dorsal nerve; it sends a branch forwards to give filaments to the external oblique muscle, and terminate in the skin at the lateral and anterior part of the chest; it sends a branch backwards to terminate in the skin of the side.

9 External branch of the ninth dorsal nerve; it sends a branch forwards to give filaments to the external oblique muscle, and terminate on the skin at the anterior and lateral part of the abdomen; it sends a branch backwards to terminate on the skin of the side.

10 External branch of the tenth dorsal nerve; it passes forwards, gives a filament to the external oblique

muscle, and terminates on the skin at the anterior part of the abdomen.

11 External branch of the eleventh dorsal nerve ; it passes downwards and forwards, gives filaments to the internal and external oblique muscles, and terminates in the skin.

12 External branch of the twelfth dorsal nerve, passing forwards and terminating in the skin on the anterior part of the dorsum of the ilium, and sending a branch as far as the great trochanter.

13 Continuation of the internal branch of the first dorsal nerve to the skin.

14 Continuation of the internal branch of the second dorsal nerve to the mamma and skin.

15 Continuation of the internal branch of the third dorsal nerve to the skin over the mamma.

16 Continuation of the internal branch of the fourth dorsal nerve to the mamma and skin.

17 Continuation of the internal branch of the fifth dorsal nerve to the skin.

18 Continuation of the internal branch of the sixth dorsal nerve to the skin.

19 Continuation of the internal branch of the seventh dorsal nerve to the skin.

20 Continuation of the internal branch of the eighth dorsal nerve to the skin.

21 Continuation of the internal branch of the ninth dorsal nerve to the skin.

22 Continuation of the internal branch of the tenth dorsal nerve to the skin.

23 Continuation of the internal branch of the eleventh dorsal nerve to the skin.

24 Continuation of the internal branch of the twelfth dorsal nerve to the skin.

25. 25 Branches of the posterior trunk of the third cervical nerve, to terminate in the skin at the back of the neck.

26 Continuation of the posterior trunk of the fourth cervical nerve to terminate in the skin.

27 Continuation of the posterior trunk of the first dorsal nerve to the skin of the back.

28 Continuation of the posterior trunk of the second dorsal nerve to the skin of the back.

29 Continuation of the posterior trunk of the third dorsal nerve to the skin of the back.

30 Continuation of the posterior trunk of the fourth dorsal nerve to the skin of the back.

31 Continuation of the posterior trunk of the fifth dorsal nerve to the skin of the back.

32 Continuation of the posterior trunk of the sixth dorsal nerve to the skin of the back.

33 Continuation of the posterior trunk of the seventh dorsal nerve to the skin of the back.

34 Continuation of the posterior trunk of the eighth dorsal nerve to the skin of the back.

35 Continuation of the posterior trunk of the ninth dorsal nerve to the skin of the back.

36 Continuation of the posterior trunk of the tenth dorsal nerve to the skin of the loins.

37 Continuation of the posterior trunk of the eleventh dorsal nerve to the skin of the loins.

38 Continuation of the posterior trunk of the twelfth dorsal nerve to the skin of the loins.

39 Continuation of the posterior trunk of the first lumbar nerve to the skin over the posterior part of the ilium.

40 Continuation of the posterior trunk of the second lumbar nerve to the skin over the posterior part of the ilium.

41 Thoracic nerves to the great and small pectoral muscles, the same as 45 P. XVII.

42 A branch of the circumflex nerve to the skin at the back of the shoulder.

Fig. 1.

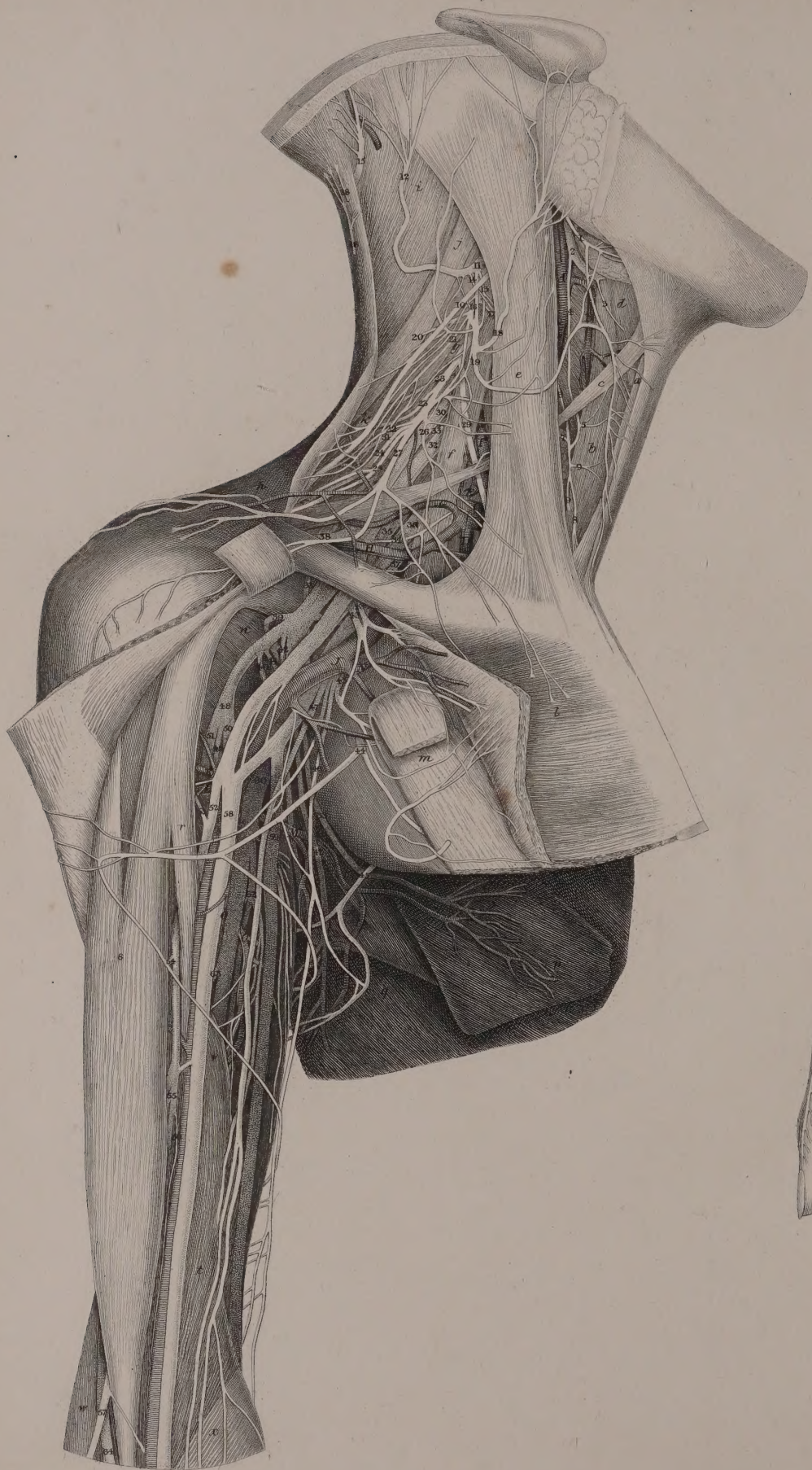
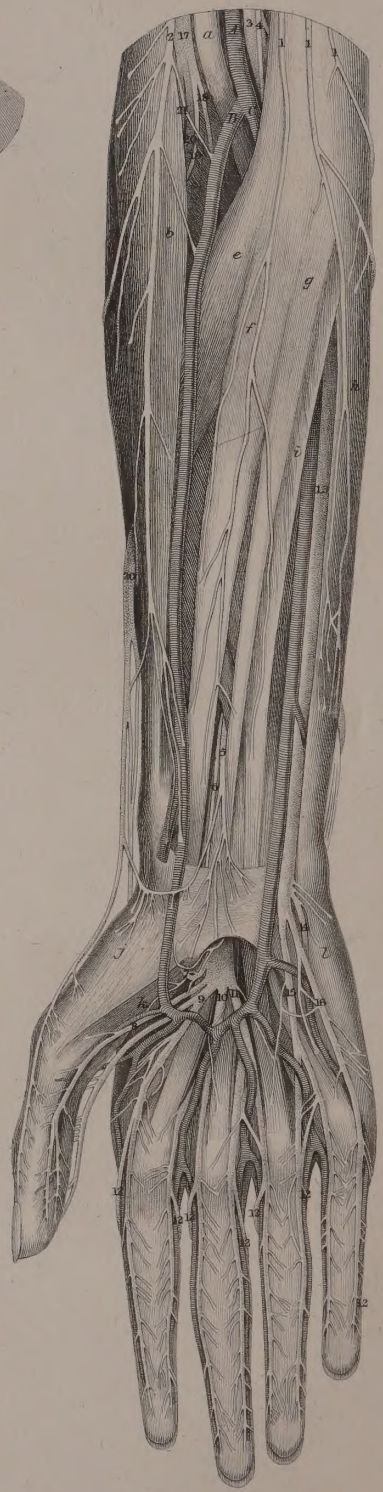


Fig. 2.



Drawn by West.

Engraved by Finden.

PLATE XXI.

FIGURE I.

After a perpendicular section of the head and neck, all the ribs, except the three uppermost, were removed, and all the vertebræ below the third dorsal; the great and small pectoral muscles were divided, and portions of the great serrated muscle and the broadest muscle of the back left.

A Carotid artery.
B Superior thyroideal artery.
C Subclavian artery.
D Internal mammary artery.
E Inferior thyroideal artery.
F Vertebral artery.
G Posterior cervical artery.
H Superior dorsal artery of the scapula.
J Axillary artery.
K Anterior circumflex artery.
L Posterior circumflex artery.
M Sub-scapular artery.
N Thoracic arteries.
O. O Two spiral arteries, arising at the same spot.

a Sterno-hyoideal muscle.
b Sterno-thyroideal muscle.
c Omo-hyoideal muscle.
d Hyo-thyroideal muscle.
e Sterno-cleido-mastoid muscle.
f Anterior scalenus muscle.
g Posterior scalenus muscle.
h Trapezius muscle.
i Splenius muscle of the head.
j Splenius muscle of the neck.
k Levator muscle of the scapula.
l Great pectoral muscle.
m Small pectoral muscle.
n Sub-scapular muscle.
o Great teres muscle.
p Great serrated muscle.
q Broadest muscle of the back.
r Coraco-brachial muscle.
s Biceps muscle.
t Internal brachial muscle.
u Long head of the triceps muscle.
v Third or inner head of the triceps muscle.
w Beginning of the long supinator muscle of the radius.
x Beginning of the round pronator muscle, the radial flexor of the wrist, and the long palmar.

1 A branch of the facial nerve.
2 Ninth nerve.
3 A branch of the ninth to the hyo-thyroideal muscle.
4 Descending branch of the ninth.
5 A branch of the descending branch of the ninth, dividing and terminating in the sterno-hyoideal muscle and the upper belly of the omo-hyoideal.
6 Union of branches, 13 and 17, from the first and second cervical nerves to join the descending branch of the ninth.
7 A branch from the union, 6, of the branches from the first and second cervical nerves near the junction of this with the descending branch of the ninth, to the inferior belly of the omo-hyoideal muscle.
8 A branch from the union, 6, of the branches from the first and second cervical nerves and the descending branch of the ninth, to the sterno-hyoideal muscle.
9 Two branches of the union, 6, from the branches of the first and second cervical nerves and the descending branch of the ninth, to the sterno-thyroideal muscle.
10 Accessory nerve, communicating with branches of the first, second, and third cervical nerves, and

giving branches as it passes downwards to the several parts of the trapezius muscle.

11 Anterior trunk of the first cervical nerve.

12 A large branch from the anterior trunk of the first cervical nerve, communicating with that of the second and the accessory, to the scalp at the posterior part of the head.

13 A branch from the first cervical nerve, dividing and sending one to join the second, and the other to pass with a branch from the second to unite with the descending branch of the ninth.

14 A branch from the first cervical nerve to the sterno-cleido-mastoid muscle.

15 Posterior trunk of the first cervical nerve, to communicate with the branch, 12, of the anterior trunk, and terminate on the scalp at the back of the head.

16 Anterior trunk of the second cervical nerve.

17 A branch of the second cervical nerve, to pass with one from the first to join the descending branch of the ninth.

18 A branch of the second cervical nerve, to terminate on the posterior part of the ear and side of the face, and communicate in the parotid gland with branches of the facial nerve.

19 A branch of the second cervical nerve, communicating with the lowest branch of the facial nerve, and terminating on the cutaneous muscle and skin at the side and front of the neck.

20 A branch from the second cervical nerve, to terminate on the splenius muscle of the neck.

21 A branch from the second cervical nerve, to communicate with one from the third joining 22, and then dividing into two: one to give a filament to a branch of the posterior cervical artery, and then join the accessory nerve; the other to unite with the branch from the third cervical nerve, and also join the accessory.

22 A branch from the second and third cervical nerves, to be distributed about the edges of the trapezius muscle.

23. 23 Two branches from the third cervical nerve to the levator muscle of the scapula.

24 A branch from the third cervical nerve, to communicate with the accessory just before this terminates in the trapezius muscle.

25 A branch of the third cervical nerve, to divide and send one branch to join the accessory, and the other to pass through the trapezius muscle and terminate on the skin at the posterior and exterior extremity of the clavicle.

26 A branch from the third cervical nerve, passing to the skin at the inferior part of the side of the neck.

27 A large branch of the third cervical nerve, dividing and distributing branches on the skin near the clavicle and acromion.

28 Two branches from the posterior trunk of the second cervical nerve, given to the skin at the back of the neck.

29 Phrenic nerve.

30 Anterior trunk of the fourth cervical nerve, passing to the axillary plexus.

31 A branch of the fourth cervical nerve, giving a filament to the posterior scalenus muscle as it passes through this to terminate on the levator muscle of the scapula.

32 Anterior trunk of the fifth cervical nerve, passing to the axillary plexus.

33 A branch of the fifth cervical nerve, passing through fibres of the middle and posterior scalenus muscles, and joining a branch of the sixth cervical nerve to terminate in the great serrated muscle.

34 A branch from the fifth cervical nerve, sending a branch downwards to the subclavian muscle, and then proceeding to join the phrenic nerve.

35 Anterior trunk of the sixth cervical nerve, passing to the axillary plexus.

36 Anterior trunk of the seventh cervical nerve, passing to the axillary plexus.

37 Part of the anterior trunk of the first dorsal nerve, passing to the axillary plexus.

38 Superior scapular nerve.

39 A branch of the axillary plexus to the sub-scapular muscle.

40 A branch of the axillary plexus to the great teres muscle.

41 A branch of the axillary plexus to the small teres muscle.

42 A branch from the axillary plexus to the broadest muscle of the back.

43 Thoracic nerves from the axillary plexus to the great and small pectoral muscles.

44 External branch of the anterior trunk of the second dorsal nerve, giving a branch to pierce the small and terminate in the great pectoral muscle, and then communicate with the external division of the third dorsal nerve and the small internal cutaneous, to terminate in the skin about the axilla, and the inner and posterior part of the arm.

45 External branch of the third dorsal nerve, to com-

municate with the external branch of the second and the small internal cutaneous nerve, to terminate on the skin about the axilla and the inferior costa of the scapula.

46 Small internal cutaneous nerve.

47 Internal cutaneous nerve.

48 Circumflex nerve.

49 A branch of the circumflex nerve to the small teres muscle.

50 A branch of the circumflex nerve to the small teres muscle, the posterior edge of the deltoid, and the skin at the back of the arm and shoulder.

51 Continuation of the circumflex nerve round the posterior and inner part of the arm bone to give a filament to the shoulder joint and terminate in the deltoid muscle.

52 Musculo-cutaneous or external cutaneous nerve.

53 A branch of the external cutaneous nerve to the coraco-brachial muscle.

54 A branch of the external cutaneous nerve to the biceps muscle.

55 A branch of the external cutaneous nerve to the internal brachial muscle.

56 A slender branch of the external cutaneous nerve accompanying the brachial artery.

57 Continuation of the external cutaneous nerve to pass down the fore-arm in cutaneous branches.

58 Median nerve.

59 Ulnar nerve.

60 Spiral nerve.

61 Branches of the spiral nerve to the great head of the triceps muscle.

62 A branch of the spiral nerve to the small and outer heads of the triceps muscle.

63 A small branch of the spiral nerve to pass outwardly between the short head of the triceps and the internal brachial muscle to the skin.

64 Continuation of the spiral nerve.

FIGURE II.

This figure is a continuation of the upper extremity of the same preparation, and is intended for showing the cutaneous nerves in the fore-arm and hand.

A Brachial artery.

B Radial artery.

C Ulnar artery.

a Tendon of the biceps muscle.

b Long supinator muscle of the radius.

c Short supinator muscle of the radius.

d Radial extensor muscle of the wrist.

e Round pronator muscle of the radius.

f Radial flexor muscle of the wrist.

g Long palmar muscle.

h Ulnar flexor muscle of the wrist.

i Sublime flexor muscle of the fingers.

j Abductor muscle of the thumb.

k Short flexor muscle of the thumb.

l Abductor muscle of the little finger.

m Lumbrical muscles.

1 Branches of the internal cutaneous nerve.

2 Continuation of the external cutaneous nerve.

3 Median nerve.

4 A branch of the median nerve to the round pronator muscle of the radius.

5 A branch of the median nerve to the skin and annular ligament, and to communicate with a branch of the radial nerve.

6 A branch of the median nerve to pass between some fibres of the annular ligament and communicate with the branch of the median given to the abductor and opponent muscles of the thumb, and terminate on the skin near the beginning of the thumb.

7 A branch of the median nerve to the abductor and opponent muscles of the thumb.

8 A branch of the median nerve to the skin on the outer side of the thumb.

9 A branch of the median nerve, to divide and send one branch to the skin, &c., at the inner side of the thumb, and the other to give a branch to the first lumbrical muscle, and terminate on the skin, &c., at the outer side of the fore-finger.

10 A branch of the median nerve, to divide and terminate on the inner side of the fore-finger, and the outer side of the second.

11 A branch of the median nerve, to divide and terminate on the inner side of the second and outer side of the ring finger.

12 Branches from the digital nerves to pass to the backs of the fingers, and communicate with those of the radial nerve and the dorsal branch of the ulnar.

13 Ulnar nerve.

14 Deep branch of the ulnar nerve.

15 A branch of the ulnar nerve, to divide and terminate

on the inner side of the ring and the outer side of the little finger.

16 A branch of the ulnar nerve, to terminate on the inner side of the little finger.

17 Continuation of the spiral nerve.

18 A branch of the spiral nerve to the short supinator muscle of the radius.

19 A branch of the spiral nerve to the long supinator muscle of the radius.

20 Radial branch of the spiral nerve.

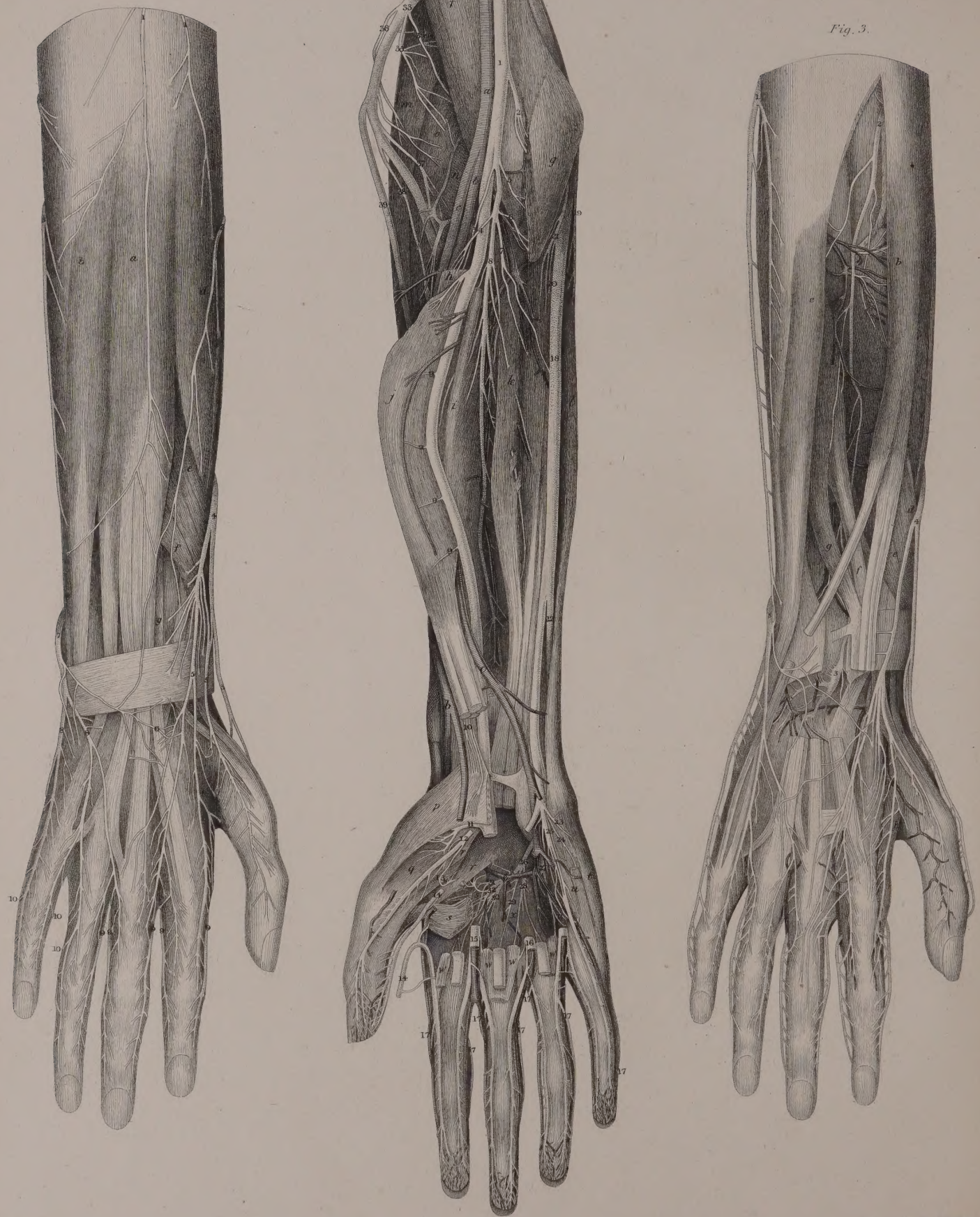
21 Continuation of the spiral nerve to pass through the short supinator muscle of the radius to the muscles at the back of the fore-arm.

Fig. 1.

Fig. 2.

PLATE XXII.

Fig. 3.



Drawn by West.

Engraved by Finden.

PLATE XXII.

FIGURE I.

This figure shows the cutaneous nerves on the posterior part of the fore-arm and hand.

a Extensor muscle of the fingers.
b Ulnar extensor muscle of the wrist.
c Longer radial extensor muscle of the wrist.
d Shorter radial extensor muscle of the wrist.
e Extensor muscle of the thumb.
f Extensor muscle of the first phalanx of the thumb.
g Extensor muscle of the second phalanx of the thumb.
h Abductor muscle of the fore-finger.

1 Divisions of the posterior cutaneous branch of the spiral nerve to the skin at the back of the fore-arm.
2 A branch of the external cutaneous nerve to the skin at the outer and posterior part of the fore-arm.
3 Branches of the internal cutaneous nerve to the skin at the inner and posterior part of the fore-arm.
4 Continuation of the radial branch of the spiral nerve.
5 Branches of the radial nerve to the skin, &c., at the back of the hand, to each side of the thumb and fore-finger and the outer side of the second, and to communicate with the posterior branches of the digital nerves.
6 A branch of the radial nerve, to communicate with one from the dorsal branch of the ulnar.
7 Dorsal branch of the ulnar nerve.
8 Branches of the dorsal branch of the ulnar nerve, to divide and terminate on the skin, &c., at the back of the hand, and on each side of the little and ring fingers and the inner side of the second, and to communicate with the posterior branches of the digital nerves.
9 Posterior branches of the digital nerves from the median, to communicate with the branches of the radial and the dorsal branch of the ulnar.
10 Posterior branches of the digital nerves of the ulnar, to communicate with branches from the dorsal branch of the ulnar.

FIGURE II.

The biceps muscle has been removed; the round pronator of the radius, the radial flexor of the wrist, and the sublime flexor muscle of the fingers have been divided near their origins; the tendons of the sublime and deep flexor muscles have been divided; the sublime flexor muscle of the fingers has been turned aside; the adductor of the thumb has been divided, and most of the digital branches of the median and ulnar nerves; the superficial arterial palmar arch, as well as portions of the tendons of the flexor muscles and portions of the lumbrical muscles, have been removed for the purpose of showing the distributions of the deep palmar branch of the ulnar nerve.

a Brachial artery.
b Radial artery.
c Ulnar artery.
d Interosseous artery.
e Deep palmar arch.
f Termination of the internal brachial muscle.
g Cut origin of the round pronator muscle of the radius.

the radial flexor of the wrist, and the sublime flexor of the fingers.

h Cut end of the radial flexor muscle of the wrist.
i Long flexor muscle of the thumb.
j Sublime flexor muscle of the fingers.
k Deep flexor muscle of the fingers.
l Ulnar flexor muscle of the wrist.
m Long supinator muscle of the radius.
n Short supinator muscle of the radius.
o Longer radial extensor muscle of the wrist.
p Abductor muscle of the thumb.
q Opponent muscle of the thumb.
r Short flexor muscle of the thumb.
s Adductor muscle of the thumb.
t Abductor muscle of the little finger.
u Short flexor muscle of the little finger.
v Adductor muscle of the little finger.
w Lumbrical muscles.
x Interosseous muscles.

1 Median nerve.
2 A branch of the median nerve to the origin of the round pronator muscle of the radius and the radial flexor of the wrist.
3 A branch of the median nerve to the round pronator muscle of the radius.
4 A branch of the median nerve to the radial flexor muscle of the wrist.
5 A branch of the median nerve to the radial flexor muscle of the wrist.
6 A branch of the median nerve to the sublime flexor muscle of the fingers.
7 A branch of the median nerve, to communicate with the ulnar and terminate in the deep flexor muscle of the fingers.
8 Interosseous branch of the median nerve, giving branches to the long flexor muscle of the thumb and the deep flexor of the fingers, and terminating in the square pronator muscle of the radius.
9 Branches of the median nerve to the sublime flexor muscle of the fingers.
10 Branches of the median nerve to the palmar fascia and skin.
11 A branch of the median nerve to the abductor and opponent muscles of the thumb.
12 A branch of the median nerve to the skin, &c. on the outer side of the thumb.
13 A branch from the branch, 12, given to the outer side of the thumb to communicate with a branch of the deep palmar branch of the ulnar nerve, and terminate with this on the short flexor muscle of the thumb.
14 Two branches of the median, one terminating on the skin, &c., on the inner side of the thumb, the other sending a filament to the first lumbrical muscle, and terminating on the skin, &c. on the outer side of the fore-finger.
15 A branch of the median nerve, giving a filament to the second lumbrical muscle, and one to embrace a digital artery, and then divide and terminate on the inner side of the fore-finger and the outer side of the second.
16 A branch of the median nerve, giving a filament to the third lumbrical muscle and one to embrace a digital artery, and terminate on the inner side of the second and the outer side of the ring finger.
17 Dorsal branches of the median and ulnar nerves, to communicate with the branches of the radial and the dorsal branch of the ulnar, and terminate on the skin, &c., at the backs of the fingers.
18 Ulnar nerve.
19 A branch of the ulnar nerve to the ulnar flexor muscle of the wrist.
20 A branch of the ulnar nerve to the ulnar flexor muscle of the wrist.
21 A branch of the ulnar nerve to the deep flexor muscle of the fingers.
22 Dorsal branch of the ulnar nerve.
23 A branch of the ulnar nerve to the abductor muscle of the little finger.
24 A branch of the ulnar nerve to the abductor and short flexor muscles of the little finger.
25 A branch of the ulnar nerve to the short flexor muscle of the little finger.
26 Deep branch of the ulnar nerve.
27 A branch of the deep branch of the ulnar nerve to the adductor muscle of the little finger and the last lumbrical muscle.
28 A branch of the deep branch of the ulnar nerve, to divide and give one filament to the joint between the metacarpal bone and first phalanx of the ring finger, several filaments to the interosseous muscles, and one to the third lumbrical.
29 A branch of the deep branch of the ulnar nerve, to give filaments to the interosseous muscles, and then terminate in the joint between the metacarpal bone and first phalanx of the second finger.
30 A branch of the deep branch of the ulnar nerve, to divide and terminate on the interosseous muscles.

31 A branch of the deep branch of the ulnar nerve, to divide and send a branch to the joint between the metacarpal bone and first phalanx of the fore-finger, and the rest to the abductor muscle of the fore-finger.

32 A branch of the deep branch of the ulnar nerve, to give one branch to the adductor muscle of the fore-finger, and the other to divide and give several filaments to the short flexor muscle of the thumb, and send one of these before and behind the tendon of the long flexor muscle of the thumb to unite with a branch of the median nerve, passing to the skin at the outer side of the thumb.

33 Continuation of the spiral nerve.

34 A branch of the spiral nerve to the internal brachial muscle.

35 A branch of the spiral nerve to the long supinator muscle of the radius and the longer radial extensor of the wrist.

36 A branch of the spiral nerve to the long supinator muscle of the radius.

37 A branch of the spiral nerve to the short supinator muscle of the radius.

38 A branch of the spiral nerve to the shorter radial extensor muscle of the wrist.

39 Radial nerve.

FIGURE III.

PART of the extensor muscle of the fingers has been divided near its origin, as well as all its tendons near the wrist, except that of the little finger; the tendon of the indicator muscle has been divided, and part of the origin of the short supinator muscle of the radius.

a Short supinator muscle of the radius.
b Extensor muscle of the fingers.
c Ulnar extensor muscle of the wrist.
d Extensor muscle of the thumb.
e Extensor muscle of the first phalanx of the thumb.
f Extensor muscle of the second phalanx of the thumb.
g Extensor muscle of the fore-finger.
h Abductor muscle of the fore-finger.

1 A branch of the internal cutaneous nerve.

2 Continuation of the spiral nerve, giving branches to the ulnar extensor muscle of the wrist, the extensor of the fingers, the long extensor of the thumb, the extensors of the first and second phalanx of the thumb, and the indicator muscle.

3 Continuation of the spiral nerve into a ganglion, which gives off branches to the carpal joints and ligaments.

4 Radial nerve.

5 Dorsal branch of the ulnar nerve.

Fig. 1.

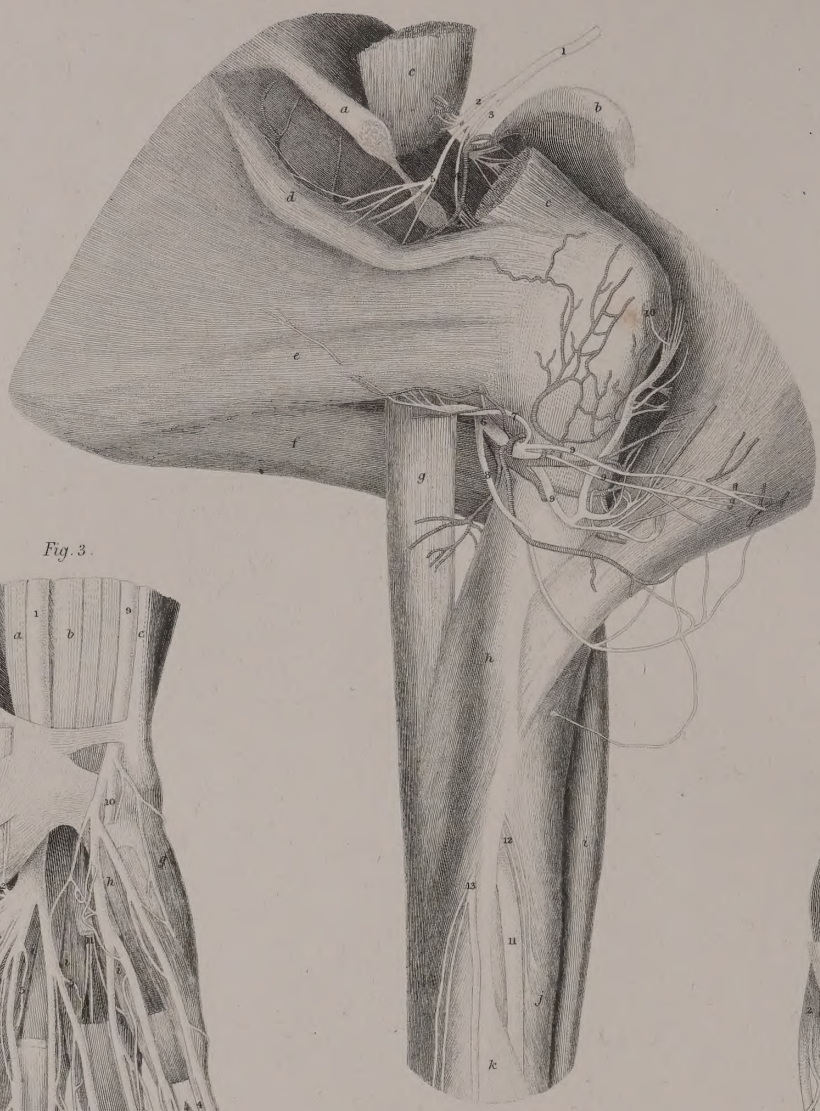


Fig. 3.

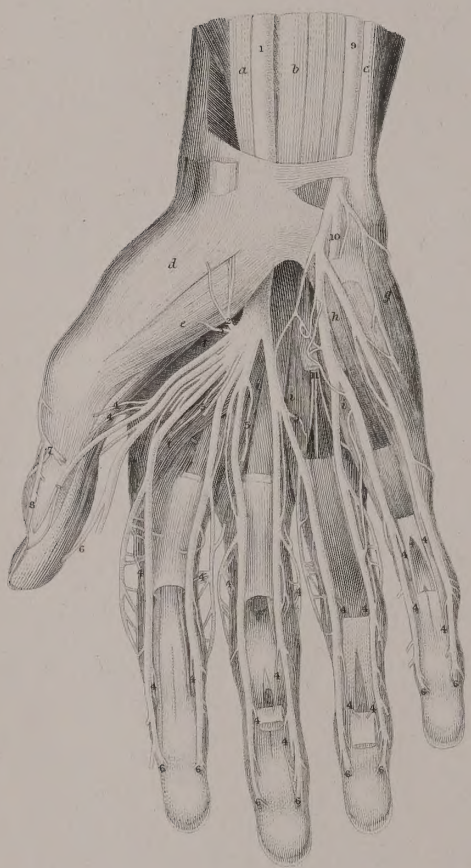


Fig. 4.

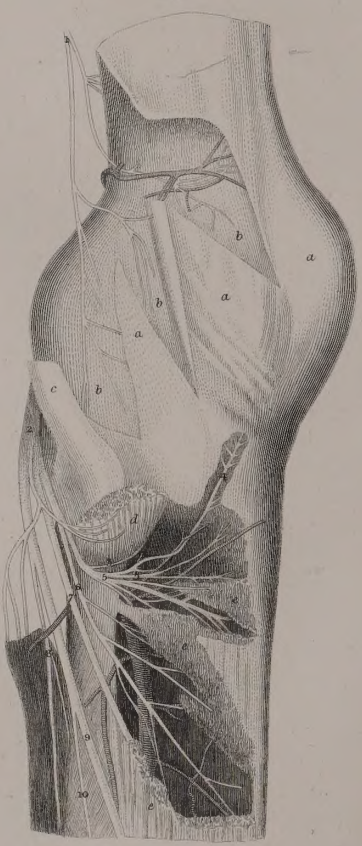


Fig. 2.

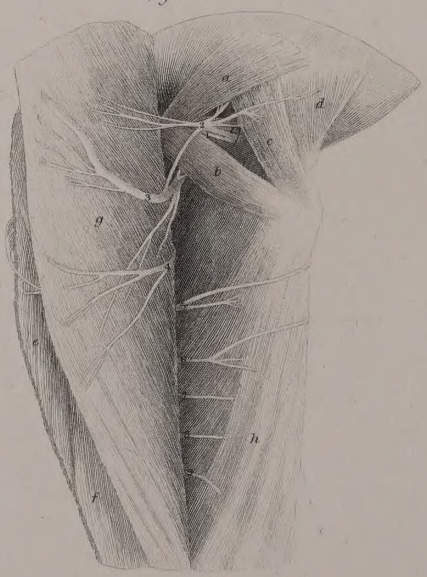


PLATE XXIII.

FIGURE I.

THIS figure shows the continuation of the superior scapular and circumflex nerves. In making the preparation the spine of the scapula was sawn across and the acromion removed; the superior spinous muscle was divided, and the inferior spinous separated from the spine; part of the origin of the deltoid muscle was also removed.

a Divided portion of the spine of the scapula.
b Clavicle.
c Superior spinous muscle.
d Inferior spinous muscle.
e Small teres muscle.
f Great teres muscle.
g Long head of the triceps muscle.
h Short head of the triceps muscle.
i Biceps muscle.
j Internal brachial muscle.
k Long supinator muscle of the radius.

1 Superior scapular nerve.
2 A branch of the superior scapular nerve to the superior spinous muscle.
3 A branch of the superior scapular nerve to the periosteum near the neck of the scapula.
4 A branch of the superior scapular nerve to the capsular ligament of the shoulder joint.
5 Continuation of the superior scapular nerve to its termination in the inferior spinous muscle.
6 Circumflex nerve.
7 A branch of the circumflex nerve, giving a filament to the inferior spinous muscle, and then terminating in the small teres; in this subject it forms an unusual ganglion.
8 Cutaneous branch of the circumflex nerve, to terminate on the skin at the posterior part of the arm and shoulder.
9 Branches of the circumflex nerve, to terminate in the deltoid muscle.
10 A branch of the circumflex nerve, to terminate in the capsular ligament of the shoulder joint.
11 Continuation of the spiral nerve.
12 Branches of the spiral nerve to terminate on the skin at the outer side of the arm.
13 Posterior cutaneous branch of the spiral nerve, passing to the skin at the back of the fore-arm and wrist.

FIGURE II.

THE complex and splenius muscles have been separated and turned aside for the purpose of showing the termination of the branches of the posterior trunk of the sub-occipital nerve.

a Superior oblique muscle of the head.
b Inferior oblique muscle of the head.
c Large posterior straight muscle of the head.
d Small posterior straight muscle of the head.
e Splenius muscle of the head.
f Transverse muscle of the neck.
g Complex muscle.
h Semi-spinal muscle of the neck.
i Vertebral artery.

1 Anterior trunk of the sub-occipital nerve.

2 Posterior trunk of the sub-occipital nerve, communicating with the posterior trunk of the first cervical nerve, and giving a branch to the complex muscle, and terminating in the superior oblique and the large and small posterior straight muscles of the head.

3 Posterior trunk of the first cervical nerve, giving filaments to the inferior oblique muscle of the head and the complex, and then piercing the latter to terminate on the scalp at the back of the head.

4 Posterior trunk of the second cervical nerve, giving branches to the complex muscle, and then piercing this and giving branches to the splenius muscle of the head, and after piercing this and the trapezius terminating on the skin at the posterior part of the neck.

5 A branch of the posterior trunk of the third cervical nerve.

6 A branch of the posterior trunk of the fourth cervical nerve.

7 A branch of the posterior trunk of the fifth cervical nerve.

8 A branch of the posterior trunk of the sixth cervical nerve.

9 A branch of the posterior trunk of the seventh cervical nerve.

FIGURE III.

THIS figure shows the nerves distributed to the tendons and joints of the fingers; many of the branches of the digital nerves have therefore been removed, as well as portions of several of the tendons.

a Long flexor muscle of the thumb.
b Tendons of the deep flexor muscle of the fingers.
c Ulnar flexor muscle of the wrist.
d Abductor muscle of the thumb.
e Short flexor muscle of the thumb.
f Adductor muscle of the thumb.
g Abductor muscle of the little finger.
h Short flexor muscle of the little finger.
i Lumbrical muscles.

1 Median nerve.

2 A branch of the median nerve to the abductor and the opponent muscles of the thumb.

3 A branch of the median nerve to the short flexor muscle of the thumb.

4 Branches of the digital nerves and their posterior branches to the joints and tendons of the fingers.

5 Branches of the median nerve to the lumbrical muscles.

6 Branches of the digital nerves to the roots of the nails, and the terminations of the sheaths of the tendons.

7 A branch from one of the branches of the radial nerve, passing from the posterior part of the thumb to the joint between the first and second phalanx of the thumb.

8 A branch from one of the branches of the radial nerve to the outer side of the root of the nail of the thumb.

9 Ulnar nerve.

10 Deep branch of the ulnar nerve.

11 Branches of the deep branch of the ulnar nerve given to the third and fourth lumbrical muscles, and the joint between the metacarpal bone and the first phalanx of the ring finger.

FIGURE IV.

THIS figure shows a branch of the sciatic nerve given to the synovial membrane and capsular ligament of the knee-joint, and the principal divisions of the peroneal nerve.

a Portions of the capsular ligament.
b Synovial membrane.
c Insertion of the tendon of the biceps muscle.
d Long peroneal muscle divided and turned aside.
e Cut portions of the anterior tibial muscle and the common extensor of the toes.

1 Continuation of a branch of the sciatic nerve that has supplied the short head of the biceps muscle, to terminate on the synovial membrane and ligaments of the knee-joint.

2 Peroneal nerve.

3 A filament of the peroneal nerve given to the capsular ligament of the tibia and fibula.

4 A filament of the peroneal nerve given to the capsular ligament of the knee-joint.

5 Branches of the peroneal nerve to the anterior tibial muscle; some of the filaments may be traced to the periosteum of the tibia, and the interosseous ligament.

6 A branch of the peroneal nerve to give filaments to the anterior tibial artery, and then terminate on the anterior tibial muscle and the common extensor of the toes.

7 Anterior tibial nerve.

8 Branches of the peroneal nerve to the long peroneal muscle.

9 Dorsal branch of the peroneal nerve.

10 A branch of the dorsal branch of the peroneal nerve to the middle peroneal muscle.

Fig. 1.

Fig. 2.

Fig. 3.

Drawn by West.

Engraved by Finden.

PLATE XXIV.

FIGURE I.

a External oblique muscle.
b Internal oblique muscle.
c Transverse muscle.
d Gracile muscle.
e Sartorius muscle.
f Straight muscle of the thigh.
g Tensor muscle of the fascia of the thigh.
h External vast muscle.
i Crural muscle.
j Internal vast muscle.
k Pectineal muscle.
l Short head of the triceps muscle.
m Long head of the triceps muscle.
n Great head of the triceps muscle.
o Termination of the internal iliac muscle.

1 The continuation of a branch of the first lumbar nerve, the same as 21 P. XVIII.; it pierces the transverse and internal oblique muscles near the anterior and superior spinous process of the ilium, communicates with one of the branches, 23 P. XVIII., and then passes forwards and divides into several branches, which pierce the tendon of the external oblique muscle, and terminate on the skin near the pubes.

2. 2 Divisions of the branch, 23 P. XVIII., of the external spermatic nerve, giving a filament to the transverse fascia, and then dividing into two branches which pierce the transverse and internal oblique muscles, when one terminates in, and the other gives filaments to these muscles; the latter, after communicating with the preceding nerve, 1, pierces the tendon of the external oblique muscle, then communicates with the external spermatic, 3, and terminates on the skin near the pubes.

3 Continuation of the principal branch of the external spermatic, 27 P. XVIII.; it passes through the internal and external rings to terminate on the skin of the pubes, and the spermatic chord or round ligament, and communicate with the preceding nerve, 2.

4 A branch of the external spermatic, the continuation of 24 P. XVIII.; it divides into two branches, which terminate on the skin near the anterior and superior spinous process of the ilium.

5 Three branches, the continuation of the branch of the external spermatic, 26 P. XVIII.; these terminate on the skin; one near the anterior and superior spinous process of the ilium; the second at the upper part of the thigh; and the third near the pubes.

6 External cutaneous nerve from the second lumbar the continuation of 28 P. XVIII., to be distributed on the skin of the outer part of the thigh.

7 Internal cutaneous nerve from the second lumbar, the continuation of 29 P. XVIII.; to be distributed on the skin at the middle and exterior of the lowest part of the thigh.

8 A branch from the anterior crural nerve, terminating in the internal iliac muscle near the insertion.

9 Anterior crural nerve.

10 First branch of the anterior crural nerve, to terminate on the straight muscle of the thigh.

11 Second branch of the anterior crural nerve to the external vast and crural muscles.

12 Third branch of the anterior crural nerve to the crural and internal vast muscles.

13 Fourth branch of the anterior crural nerve to the sartorius muscle.

14 Fifth branch of the anterior crural nerve, dividing into four others, 15. 16. 17. 17.

15 A branch of 14, piercing the sartorius muscle, and dividing into two branches to terminate on the skin, one just above the patella, the other at the inner side of the knee.

16 A branch of 14, piercing the sartorius muscle, and communicating with one of the branches of 19, and terminating on the skin at the middle of the thigh.

17. 17 Two branches of 14, terminating in the sartorius muscle.

18 Part of the sixth branch of the anterior crural nerve arising along with the branch 19; it passes down on the outer side of the femoral artery, and sends a filament from underneath the sartorius muscle to communicate with the cutaneous branch of the obturator nerve and terminate in the skin; it then passes in some fascia connected with the tendon of the great head of the triceps muscle, communicates with the division of the saphenus nerve, 23, and gives a filament to accompany an artery near the knee.

19 Part of the sixth branch of the anterior crural nerve, arising along with 18; it passes downwards and divides into two: one of these gives filaments to the skin, and terminates in one of the branches of the saphenus nerve passing from underneath the sartorius muscle; the other communicates with the cutaneous branch of the obturator nerve, and then terminates with a small artery at the lower part of the thigh.

20 Seventh branch of the anterior crural nerve, to terminate on the skin at the upper and inner part of the thigh.

21 Eighth branch of the anterior crural nerve, passing along with and giving filaments to the saphena vein.

22 Ninth branch of the anterior crural nerve to the pectineal muscle.

23 One division of the tenth branch of the anterior crural, forming part of the saphenus nerve; after dividing it sends one branch underneath the external edge of the lower part of the sartorius muscle, gives filaments to the skin and ligaments at the inner side of the knee, and then passes below the patella to give filaments to the skin and ligaments on the outer side of the knee; the other also passes from underneath the external edge of the sartorius muscle, gives a filament to the skin, and then joins the division of the saphenus nerve, 24.

24 The other division of the tenth branch of the anterior crural nerve, forming part of the saphenus nerve; it sends a filament to the capsular ligament, &c., of the knee joint, and passes from underneath the external edge of the sartorius muscle, and is continued downwards about the inner edge of the tibia along with the saphena vein; it proceeds over the inner ankle to the side of the foot as far as the great toe, and throughout its course gives filaments to the fascia, periosteum, and skin.

25 Obturator nerve.

26 A branch of the obturator nerve to the short head of the triceps muscle.

27 A branch of the obturator nerve to the long head of the triceps muscle.

28 A branch of the obturator nerve to the gracile muscle.

29 A branch of the obturator nerve, giving a filament to the long head of the triceps muscle, and then terminating on the skin at the inner part of the thigh, and communicating with the branches 18 and 19 of the anterior crural nerve.

30 A branch from the superior portion of the gluteal plexus, passing forward underneath the middle gluteal muscle to the tensor muscle of the sheath of the thigh.

FIGURE II.

a Anterior tibial muscle.

b Extensor muscle of the great toe.

c Common extensor muscle of the toes.

d Long peroneal muscle.

e Short peroneal muscle.

f Short extensor muscle of the toes.

1. 1 Continuations of the division of the saphenus nerve, 24 Fig. 1.

2 Continuation of the dorsal branch of the peroneal nerve.

3 A branch of the dorsal branch of the peroneal nerve to the middle peroneal muscle.

4 Inner division of the dorsal branch of the peroneal nerve, giving filaments to the foot, the inner side of the great toe, the outer side of the second and inner side of the third toes.

5 Outer division of the dorsal branch of the peroneal nerve, giving filaments to the foot and communicating with the long cutaneous branch, and then supplying the outer side of the third and the inner side of the fourth, the outer side of the fourth, and the inner side of the little toe.

6 Anterior tibial nerve giving filaments to the anterior tibial muscle, the long extensor of the great toe and common extensor of the toes, and passing under the annular ligament to give filaments to the foot, and divide and terminate on the outer side of the great toe and the inner side of the second.

7 Continuation of the long cutaneous branch of the peroneal, giving a branch to the outer side of the back of the foot, and communicating with the outer division of the dorsal branch of the peroneal, then passing on the outer side of the foot and little toe, and giving off numerous filaments in its course.

FIGURE III.

a Anterior tibial artery.

b Short extensor muscle of the toes divided.

1. 1 Divisions of the dorsal branch of the peroneal nerve, given to the inner side of the foot and great toe, to the outer side of the second, to each side of the third and fourth and the inner side of the little toe.

2 Long cutaneous branch of the peroneal nerve, passing to the outer side of the foot and little toe.

3 Anterior tibial nerve.

4 Exterior branch of the anterior tibial nerve, giving filaments to the short extensor muscle of the toes, the interosseous muscles, the ligaments and joints.

Fig. 1.

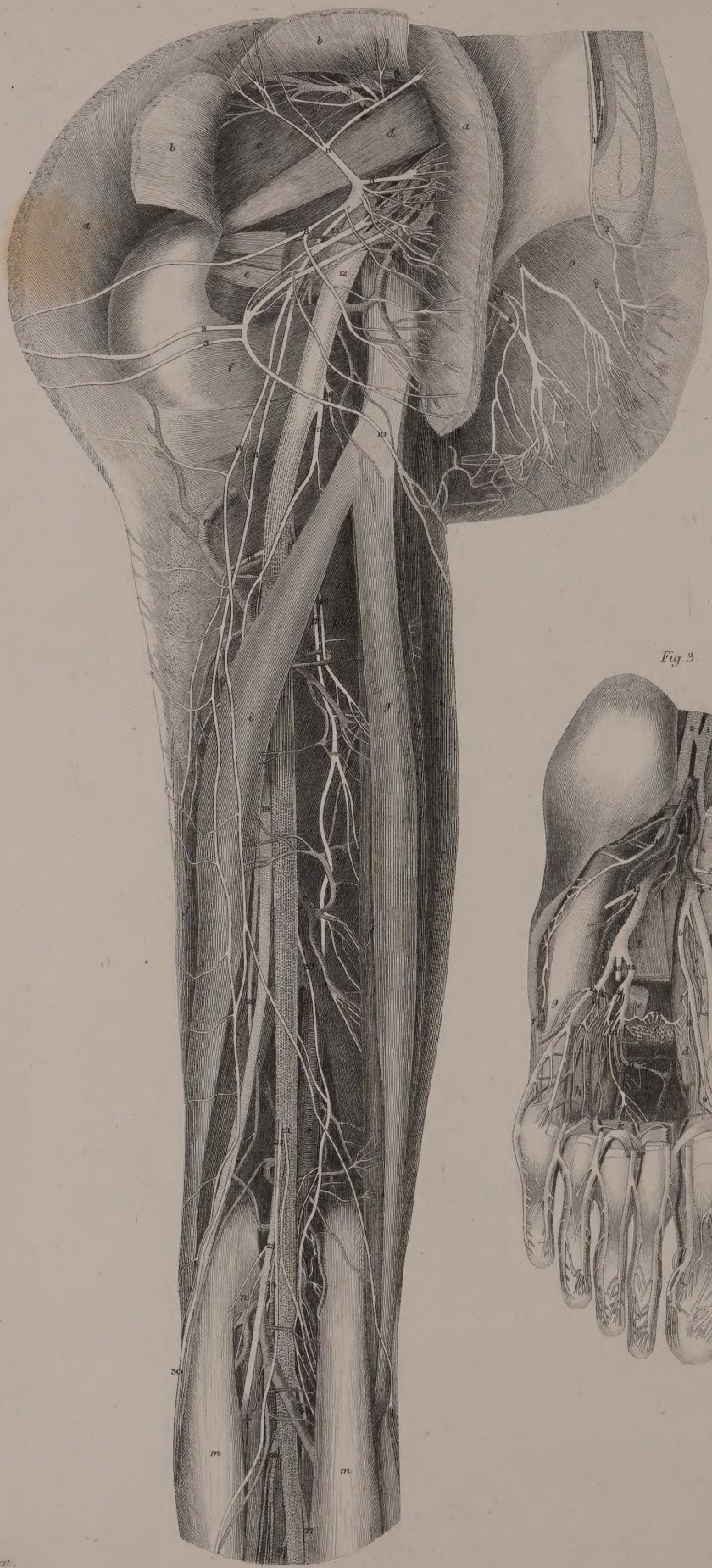


Fig. 2.

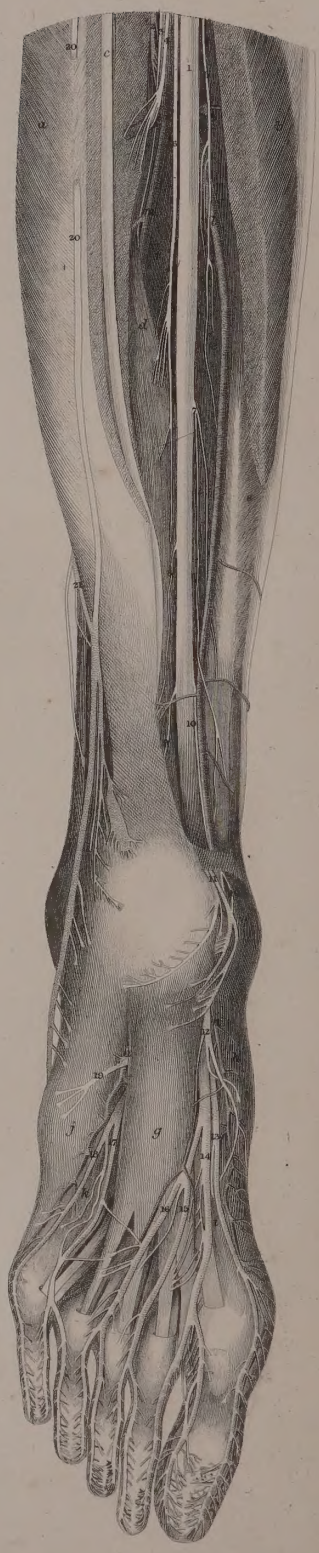


Fig. 3.

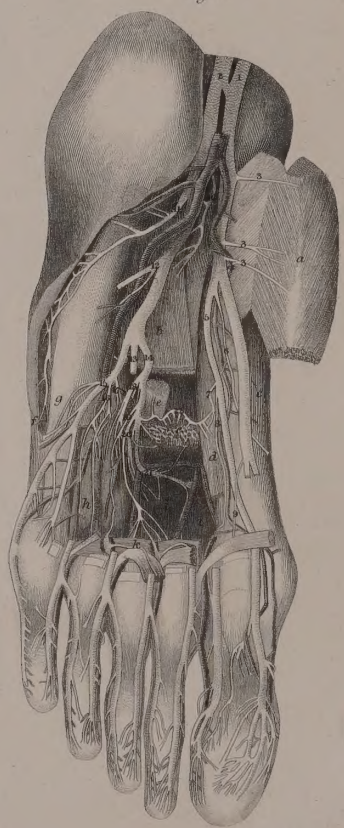


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PLATE XXV.

FIGURE I.

THE great and middle gluteal muscles have been divided and turned aside; the geminous muscle and the tendon of the internal obturator have been divided for the purpose of showing the nerve passing behind and terminating on the geminous, the square muscle of the thigh, and the capsular ligament of the hip joint; the junction of the two heads of the gastrocnemius muscle has been also separated.

a Great gluteal muscle.
b Middle gluteal muscle.
c Small gluteal muscle.
d Pyriform muscle.
e Geminous muscle and the tendon of the internal obturator divided.
f Square muscle of the thigh.
g Semi-tendinous muscle.
h Semi-membranous muscle.
i Long head of the biceps muscle.
j Short head of the biceps muscle.
k Great head of the triceps muscle.
l Gracile muscle.
m External gastrocnemius muscle.
n Plantar muscle.
o Levator muscle of the anus.
p Gluteal artery.
q Ischiatic artery.
r Perforating branches of the profunda artery.
s Popliteal artery.

1 Termination of the posterior trunks of the sacral nerves on the skin about the bone of the coccyx and the lower part of the sacrum.

2. 2 Branches of the anterior trunk of the fifth sacral nerve, perforating the levator muscle and terminating on the skin about the anus.

3 Continuation of the anterior trunk of the fourth sacral nerve, the same as 44 P. XVIII., to communicate with the branch 4 of the internal pudendal nerve, and terminate on the sphincter and skin about the anus.

4. 4 Branches of the internal pudendal nerve, the continuation of 37 P. XVIII., giving filaments to the sphincter of the anus and the vagina, and terminating on the skin.

5 A branch of the internal pudendal nerve, the continuation of 36 P. XVIII., terminating on the clitoris and adjacent parts.

6 Superior part of the gluteal plexus, the continuation of 33 P. XVIII., passing above the pyriform muscle to the middle and small gluteal muscles, and sending a branch forward underneath the middle one to the tensor of the sheath of the thigh.

7 Inferior part of the gluteal plexus.

8 Branches of the inferior part of the gluteal plexus, given to the great gluteal muscle.

9. 9 Branches of the inferior part of the gluteal plexus, to wind round the inferior edge of the great gluteal muscle to the skin at the posterior part of the great trochanter.

10 A branch of the inferior part of the gluteal plexus, to give filaments to the skin about the tuberosity of the ischium, and send one forwards over the descending branch of the pubes to the skin near the labium, and communicate with a branch of the internal pudendal nerve.

11 Two long cutaneous branches from the inferior part of the gluteal plexus, to give filaments to the skin and pass down on the posterior part of the thigh to terminate on the skin of the outer and inner side of the ham.

12 Sciatic nerve.

13 A branch from the superior part of the sciatic nerve, to pass behind the geminous muscle, and the tendon of the internal obturator, to give filaments to this and the posterior part of the capsular ligament of the hip joint, and terminate in the square muscle of the thigh.

14 A branch of the sciatic nerve to the semi-membranous muscle.

15 A branch of the sciatic nerve to the long head of the biceps muscle.

16 A branch of the sciatic nerve to the semi-tendinous muscle.

17 A branch of the sciatic nerve, sending a branch behind the semi-membranous muscle to the great head of the triceps, and then terminating in the semi-membranous muscle.

18 A branch of the sciatic to the short head of the biceps muscle.

19 Peroneal nerve.

20 A branch of the sciatic nerve, giving filaments to several branches of the popliteal artery, and dividing into branches to terminate on the ligaments at the posterior and inner side of the knee joint.

21 A branch of the sciatic nerve, to terminate on the outer head of the external gastrocnemius muscle.

22 A branch of the sciatic nerve called the communicating tibial; its continuation may be seen 20 Fig. 2.

23 A branch of the sciatic nerve, giving branches to the inner head of the external gastrocnemius muscle, and then terminating on the internal gastrocnemius muscle.

24 A branch of the sciatic nerve to the plantar muscle.

25 A branch of the sciatic nerve to the popliteal muscle.

26 A branch of the sciatic nerve, dividing into 2. 3. 4 Fig. 2.

27 A branch of the posterior tibial nerve; its continuation is seen in 5 Fig. 2.

28 A branch of the posterior tibial nerve; its continuation is seen in 6 Fig. 2.

29 A branch of the peroneal nerve, passing forward underneath the lowest part of the biceps muscle, giving a branch to the short head of this muscle, and then passing to the ligaments and synovial membrane of the outer side of the knee joint.

30 A long cutaneous branch of the peroneal nerve, to give a branch to the skin on the outer side of the leg, and then pass through some fibres of the external gastrocnemius muscle to join the communicating tibial, give branches to the skin on the outer side of the heel, and terminate on the outer side of the back of the foot and little toe.

FIGURE II.

THE external and internal gastrocnemius muscles have been divided longitudinally; some portions of these have been removed and the rest turned aside.

a External gastrocnemius muscle.
b Internal gastrocnemius muscle.
c Tendon of the plantar muscle.
d Long flexor muscle of the great toe.
e Long flexor muscle of the toes.
f Posterior tibial muscle.
g Short flexor muscle of the toes.
h Abductor muscle of the great toe.
i Short flexor muscle of the great toe.
j Abductor muscle of the little toe.
k Short flexor muscle of the little toe.
l Posterior tibial artery.
m Peroneal artery.
n Plantar artery.

1 Posterior tibial nerve.

2 Continuation of one branch of 26 Fig. 1, to the posterior tibial muscle.

3 Continuation of the small branch of 26 Fig. 1, to terminate on the periosteum of the fibula.

4 Continuation of one branch of 26 Fig. 1, to terminate on the internal gastrocnemius muscle.

5 A branch of the posterior tibial nerve to the long flexor muscle of the toes; it is the continuation of 27 Fig. 1.

6 A branch of the posterior tibial nerve to the long flexor muscle of the great toe; it is the continuation of 28 Fig. 1.

7. 8. 9 Branches of the posterior tibial nerve, passing to the fascia and ligaments and fat at the lower part of the leg.

10 A branch of the posterior tibial nerve, passing behind the posterior tibial artery and commu-

nicating with one of the branches given to the skin on the inner side of the heel, and then joining the inner plantar nerve.

11 Branches from the posterior tibial nerve to the skin and fat on the inner side of the heel.

12 Branches from the inner plantar nerve to the skin and fascia on the inner side of the foot.

13 A branch of the inner plantar nerve, giving a branch to the short flexor of the great toe, and then passing on the inner side of the foot and great toe to terminate on the skin and fascia.

14 A branch of the inner plantar nerve, giving a filament to the first lumbrical muscle, and then terminating on the outer side of the great toe and the inner side of the second.

15 A branch of the inner plantar nerve, terminating on the outer side of the second and the inner side of the third toe.

16 A branch of the inner plantar nerve, communicating with a branch of the outer, and terminating on the outer side of the third and the inner side of the fourth toe.

17 A branch of the outer plantar nerve, communicating with a branch of the inner, and terminating on the outer side of the fourth and the inner side of the little toe.

18 A branch of the outer plantar nerve, terminating on the skin on the outer side of the foot and little toe.

19 A branch of the outer plantar nerve, terminating on the skin at the outer side of the foot.

20 Communicating tibial branch of the sciatic nerve; the continuation of 22 Fig. 1.

21 Long cutaneous branch of the peroneal nerve, receiving the communicating tibial and giving branches to the skin on the outer side of the heel, and terminating on the outer side of the back of the foot and little toe.

FIGURE III.

The short flexor muscle of the toes has been detached from its origin, and its tendons divided; the short flexor of the great toe has been divided at its insertion, and a portion removed; portions of the tendons of both the long and short flexor and of the lumbrical muscles have been removed.

a Short flexor muscle of the toes.
b Accessory flexor muscle of the toes.
c Abductor muscle of the great toe.
d Short flexor muscle of the great toe.
e Adductor muscle of the great toe.
f Abductor muscle of the little toe.
g Short flexor muscle of the little toe.
h Adductor muscle of the little toe.
i Interosseous muscles.
k Transverse muscle of the foot.
l Posterior tibial, dividing into the plantar arteries.

1 Inner plantar nerve.

2 Outer plantar nerve.

3 Branches of the inner plantar nerve to the short flexor muscle of the toes.

4 A branch of one of the preceding branches, 3, to the abductor muscle of the great toe.

5 A branch of the inner plantar nerve to the inner side of the great toe.

6 A branch of the branch, 5, of the inner plantar nerve to the skin.

7 A branch of the branch, 5, of the inner plantar nerve, giving filaments to the short flexor muscle of the great toe, and communicating with the branch of the deep plantar nerve supplying the adductor muscle of the great toe.

8 A branch of the branch, 5, of the inner plantar nerve, to terminate in the joint of the great toe between the metatarsal bone and the first phalanx.

9 A filament to the first lumbrical muscle from the branch of the inner plantar nerve, giving branches to the outer side of the great toe and the inner side of the second.

10 A branch of the outer plantar nerve to the accessory flexor of the toes.

11 A branch of the outer plantar nerve, given to the origin of the short flexor muscle of the toes and the abductor of the little toe.

12 A branch from the outer plantar nerve, giving a small branch to the ligaments of the tarsal joints, and then terminating in the skin at the side of the foot.

13 Cut end of the branch of the outer plantar nerve, supplying the outer side of the fourth and the inner side of the little toe.

14 Deep plantar nerve.

15 Branches of the outer plantar nerve, giving filaments to the outer side of the foot and little toe.

16 A branch of the outer plantar nerve, sending a filament to the joint of the little toe, to the last interosseous muscle, and the last lumbrical.

17 A branch of the outer plantar nerve, dividing and giving one to the fascia, and the other to pass outwardly to the short flexor muscle of the little toe.

18 A branch of the deep plantar nerve to the interosseous muscles.

19 A branch of the deep plantar nerve, giving filaments to the interosseous muscles and one to the third lumbrical.

20 A branch of the deep plantar nerve, giving filaments to the interosseous muscles, and sending a branch down to the transverse muscle of the foot and the second lumbrical.

21 Continuation of the deep plantar nerve, to terminate in the interosseous muscles and the adductor of the great toe.

22 A branch of the deep plantar nerve, giving a filament to the upper surface of the adductor muscle of the great toe, and then passing between some of the fibres to the under surface to give more filaments to this muscle, and communicate with the branch, 7, of the inner plantar nerve sent to the short flexor of the great toe.

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